6. VEGETATION COMMUNITY DESCRIPTIONS OF VOYAGEURS NATIONAL PARK

6.1 Bogs

Picea mariana / Ledum groenlandicum / Carex trisperma / Sphagnum spp. Forest (Black Spruce Bog)

COMMON NAME	Black Spruce / Labrador-tea / Three-fruit Sedge / Peatmoss species Forest
SYNONYM	Black Spruce Bog
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	PICEA MARIANA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is found in the Rat Root River peatland area and in the peatland complex between Black Bay and Cranberry Bay.

Globally

This association is found in Maine, Michigan, Minnesota, Manitoba, Ontario, and probably Wisconsin.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Black Spruce Bog is found in situations removed from ground and surface water inputs and only in the interior of large peatlands. It may occur at the crests of raised bogs and adjacent to water tracks. The substrate is deep, acidic Sphagnum peat which is mineral poor. Hummock and hollow microtopography is moderately to well developed. The water regime is saturated.

Globally

Stands are found most typically on the crests of raised bog landforms in large peatland complexes, as well as in basin bogs, where the peat mat surface is removed from contact with ground and surface water inputs. Sites are poorly drained, with wet, saturated organic substrates. Hummock and hollow microtopography is moderately to well developed. (Sims *et al.* 1989, Minnesota DNR 1993, McCarthy *et al.* 1994, Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Picea mariana*
Tall shrub	*Picea mariana*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex trisperma*
Nonvascular	*Sphagnum* spp.

Globally

Tree canopy	*Picea mariana*
Tall shrub	*Picea mariana*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex trisperma*

Nonvascular *Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Picea mariana, Ledum groenlandicum, Chamaedaphne calyculata, Carex trisperma

Globally

Picea mariana, Ledum groenlandicum, Chamaedaphne calyculata, Carex trisperma

VEGETATION DESCRIPTION

Voyageurs National Park

This community includes both a woodland and a forested phase, so canopy cover is widely variable. *Picea mariana* trees dominate this type and are typically 10-15 m tall in the forested phase and 5-10 m tall in the woodland phase. Scattered *Larix laricina* trees are occasionally present. The canopy, especially in the woodland phase, tends to be uneven aged. Shrub strata are usually absent, though *Picea mariana* saplings may be present at low cover. The dwarf-shrubs *Ledum groenlandicum* and *Chamaedaphne calyculata* are nearly always present, but cover is highly variable, ranging from 20-90%. Other ericaceous shrubs such as *Kalmia polifolia, Andromeda polifolia,* and *Vaccinium oxycoccos* can also be present at low cover. The herbaceous strata is species poor and present at low density, usually less than 40% cover. The most widespread species are *Carex trisperma* and *Maianthemum trifolium*. In some cases, *Carex chordorhiza* or *Carex pauciflora* may take the place of *Carex trisperma*. The herbs *Eriophorum vaginatum, Cornus canadensis, Drosera rotundifolia,* and *Sarracenia purpurea* may also be present at low cover. Sphagnum moss typically covers nearly 100% of the forest floor. The most abundant species are *Sphagnum magellanicum*, *Sphagnum recurvum sensu lato,* and *Sphagnum fuscum*.

Globally

Trees cover at least 25% of the canopy, varying in height from 3 m to over 10 m. *Picea mariana* is often the sole species in the canopy. *Larix laricina* may occasionally occur. The dwarf-shrub layer is dominated by *Ledum groenlandicum* and other ericaceous shrubs, such as *Chamaedaphne calyculata, Vaccinium myrtilloides, Vaccinium oxycoccos, Kalmia polifolia, Gaultheria hispidula*, and *Andromeda polifolia*. *Picea mariana* may also be found in scrub form in this layer. The ground cover consists of a species-poor herb layer, with *Carix trisperma, Eriophorum vaginatum*, and *Maianthemum trifolium* most prevalent. In northern Minnesota, *Carex chordorhiza* or *Carex pauciflora* may take the place of *Carex trisperma* in some stands, and the herbs *Eriophorum vaginatum, Cornus canadensis, Drosera rotundifolia,* and *Sarracenia purpurea* may also be present at low cover (M. Smith personal communication 1999). Moss cover is a *Sphagnum* carpet with patches of feathermoss (especially *Pleurozium schreberi*) and conifer litter beneath the trees. Dominant sphagnum species include *Sphagnum magellanicum, Sphagnum fuscum*, and *Sphagnum angustifolium*, and less commonly, *Sphagnum capillifolium, Sphagnum nemoreum*, and *Sphagnum girgensohnii*. Minerotrophic indicators, such as *Betula pumila, Carex stricta*, and *Carex aquatilis*, are absent (Sims *et al.* 1989, Minnesota NHP 1993, McCarthy *et al.* 1994, Harris *et al.* 1996).

CONSERVATION RANK G5.

DATABASE CODE CEGL002485

COMMENTS

Voyageurs National Park

Diagnostic features of the type are forested or woodland canopy of *Picea mariana* within a large peatland, often with a raised bog, and a species-poor understory. The woodland (25-60%) and forested (60-100%) phases can be distinguished through mapping, but appear to be the same type floristically. The type is analogous to Ontario's W26, which includes all treed bog stands with tree cover > 25% (Harris *et al.* 1996). In some cases, this community closely resembles more nutrient poor examples of the Black Spruce/Labrador Tea Poor Swamp. The Black Spruce/Labrador Tea Poor Swamp will generally contain more minerotrophic indicators than the Black Spruce Bog. Position on the landscape, however, is the best way to distinguish these types. The Black Spruce Bog is found only in the interior of large peatlands whereas the Black Spruce/Labrador Tea Poor Swamp is found in confined basins, shores, and the margins of large peatlands.

In the park and environs this community has been mapped only in the Rat Root Peatland and in a large peatland between Cranberry and Black Bays.

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea mariana / Chamaedaphne calyculata / Sphagnum spp. Dwarf-shrubland (Black Spruce / Leatherleaf Semi-treed Bog)

COMMON NAME	Black Spruce / Leatherleaf / Peatmoss species Dwarf-shrubland
SYNONYM	Black Spruce / Leatherleaf Semi-treed Bog
PHYSIOGNOMIC CLASS	Dwarf-shrubland (IV)
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland (IV.A)
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (IV.A.1.N)
FORMATION	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1.N.g)
ALLIANCE	CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type occurs throughout the park and is extensive in the Rat Root Peatland.

Globally

This association is found in northern Minnesota, northern Michigan, northern Wisconsin, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs in confined basins, as part of large peatlands and as part of peatland shores. In the latter case, this type usually occurs away from the water's edge, often separated from it by a shrub bog. The substrate is deep fibric Sphagnum peat, which is mineral poor. High hummocks are often well developed while hollows are poorly developed. The water regime is saturated.

Globally

Sites are on the crests of raised bogs in large peatland complexes, in basin bogs, and occasionally on shores isolated from ground water influence (Sims *et al.* 1989, Harris *et al.* 1996). The substrate is deep fibric Sphagnum peat, which is mineral poor. High hummocks are often well developed while hollows are poorly developed. The water regime is saturated.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Picea mariana, Larix laricina*
Short shrub	*Chamaedaphne calyculata,*
Forb	*Maianthemum trifolium, Sarracenia purpurea*
Graminoid	*Eriophorum vaginatum*
Nonvascular	*Sphagnum magellanicum, Sphagnum fuscum, Sphagnum angustifolium*

Globally

Tall shrub	*Picea mariana, Larix laricina*
Short shrub	*Chamaedaphne calyculata,*
Forb	*Maianthemum trifolium, Sarracenia purpurea*
Graminoid	*Eriophorum vaginatum*
Nonvascular	*Sphagnum magellanicum, Sphagnum fuscum, Sphagnum angustifolium*

CHARACTERISTIC SPECIES

Voyageurs National Park

Chamaedaphne calyculata,Picea mariana, Larix laricina, Eriophorum vaginatum, *Sphagnum* spp.

Globally

Chamaedaphne calyculata,Picea mariana, Larix laricina, Eriophorum spp., *Carex oligosperma, Carex pauciflora, Sarracenia purpurea, Sphagnum* spp.

VEGETATION DESCRIPTION

Voyageurs National Park

Picea mariana and/or *Larix laricina* are the dominate conifers in this community, though in some cases, *Pinus strobus* may be locally abundant. These conifers are present at 10-25% cover and are usually 2-10 m tall. The dwarf-shrub layer consists mainly of *Chamaedaphne calyculata* and usually comprises 90-100% cover. Other dwarf ericaceous shrubs such as *Andromeda polifolia, Kalmia polifolia, Vaccinium oxycoccos* and *Ledum groenlandicum* are often present but rarely make up a significant cover. The herbaceous strata is poorly developed with low species diversity and very sparse cover, typically less than 10%. The most abundant species are *Maianthemum trifolium, Eriophorum vaginatum, Sarracenia purpurea, Carex oligosperma* and *Drosera rotundifolia*. Minerotrophic indicators are absent. *Sphagnum magellanicum, Sphagnum fuscum,* and *Sphagnum angustifolium* form a continuous carpet of peat moss. Typically, *Sphagnum fuscum* dominates the high hummocks, *Sphagnum magellanicum* dominates the lower and developing hummocks and *Sphagnum angustifolium* colonizes the hollows. Other mosses such as *Aulacomnium palustre* and *Polytrichum strictum* may also be present.

Globally

Vegetation structure is complex with a dominant layer of dwarf-shrubs, stunted trees and hummock-hollow microtopography, sometimes referred to as muskeg. Ericaceous dwarf-shrubs dominante the stand, with over 40% cover. Dominant species include *Andromeda polifolia, Chamaedaphne calyculata, Kalmia polifolia*, and *Ledum groenlandicum*. Creeping dwarf-shrubs include *Gaultheria hispidula* and *Vaccinium oxycoccos*. Trees average about 10 - 25% cover, may be stunted (3 m tall), and are often clumped on higher hummocks with intervening, weakly-developed hollows. Typical species include *Picea mariana* and *Larix laricina*. The herbaceous layer contains graminoids such as *Carex oligosperma, Carex pauciflora*, and *Eriophorum vaginatum*, and forbs such as *Maianthemum stellatum* and *Sarracenia purpurea*. The nonvascular layer contains a carpet of *Sphagnum* (including *Sphagnum fuscum* and *Sphagnum magellanicum*), with patches of *Pleurozium schreberi* (Sims *et al.* 1989, Harris *et al.* 1996).

CONSERVATION RANK G?

DATABASE CODE CEGL005218

COMMENTS

Voyageurs National Park

Diagnostic features of the type are the dwarf-shrub layer dominated by *Chamaedaphne calyculata* with 10-25% cover of conifers (typically *Picea mariana* and/or *Larix laricina*). This type differs from the Leatherleaf Bog (CEGL002498) primarily in the density of conifers. That type has less than 10% tree cover. This type is analogous to Ontario's W25 (Harris *et al.* 1996). In large peatlands (like Rat Root Peatland) this community can grade into the woodland phase of the Black Spruce Bog (CEGL002485).

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Chamaedaphne calyculata - Ledum groenlandicum - Kalmia polifolia Bog Dwarf-shrubland (Leatherleaf Bog)

COMMON NAME	Leatherleaf - Labrador-tea - Bog Laurel Bog Dwarf-shrubland
SYNONYM	Leatherleaf Bog
PHYSIOGNOMIC CLASS	Dwarf-shrubland (IV)
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland (IV.A)
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (IV.A.1.N)
FORMATION	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1.N.g)
ALLIANCE	CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park
This type occurs throughout the park.

Globally
This association is found in Michigan, Minnesota, Wisconsin, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION
Voyageurs National Park
This type occurs in confined basins, as part of large peatlands, and as part of shoreline complexes. In the later case, the Leatherleaf bog can occur right up to the water's edge or spatially removed from the influence of the water. Stands that occur right up to the water's edge do so only because the lakes are oligotrophic (with granite bedrock basins). The substrate is deep fibric Sphagnum peat which is mineral poor. High hummocks are often well developed while hollows are poorly developed. The water regime is saturated.

Globally
Sites are found on raised bog landforms in large peatland complexes, basin bogs, and occasionally on shores (but still isolated from groundwater influence). Stands have a saturated hydrology with a fibric *Sphagnum* spp. peat soil and a pH usually < 4.3 (Harris *et al.* 1996, Minnesota NHP 1993).

MOST ABUNDANT SPECIES
Voyageurs National Park

Stratum	Species
Tall shrub	*Picea mariana, Larix laricina*
Short shrub	*Chamaedaphne calyculata*
Forb	*Maianthemum trifolium, Sarracenia purpurea*
Graminoid	*Eriophorum vaginatum*
Nonvascular	*Sphagnum magellanicum, Sphagnum fuscum, Sphagnum angustifolium*

Globally

Stratum	Species
Tree canopy	*Picea mariana, Larix laricina*
Short shrub	*Chamaedaphne calyculata, Ledum groenlandicum*
Graminoid	*Carex oligosperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES
Voyageurs National Park
Chamaedaphne calyculata, Maianthemum trifolium, Sarracenia purpurea, Eriophorum vaginuatum, Sphagnum spp.

Globally

Chamaedaphne calyculata, Ledum groenlandicum, Carex oligosperma, Sphagnum spp.

VEGETATION DESCRIPTION

Voyageurs National Park

This community is dominated by an ericaceous dwarf-shrub layer consisting mainly of *Chamaedaphne calyculata.* Other dwarf ericaceous shrubs such as *Andromeda polifolia, Kalmia polifolia, Vaccinium oxycoccos,* and *Ledum groenlandicum* are often present but rarely make up a significant cover. Total cover of the dwarf-shrubs is usually 90-100%. A scattered tall shrub layer of *Picea mariana, Larix laricina* or, rarely, *Pinus strobus* can exist at <10% cover. The herbaceous strata is poorly developed with low species diversity and very sparse cover, typically less than 10%. The most abundant species are *Maianthemum trifolium, Eriophorum vaginatum, Sarracenia purpurea, Carex oligosperma,* and *Drosera rotundifolia*. *Sphagnum magellanicum, Sphagnum fuscum,* and *Sphagnum angustifolium* form a continuous carpet of peat moss. Typically, *Sphagnum fuscum* dominates the high hummocks, *Sphagnum magellanicum* dominates the lower and developing hummocks and *Sphagnum angustifolium* colonizes the hollows. Other mosses, such as *Aulacomnium palustre, Polytrichum strictum*, and *Sphagnum recurvum sensu stricta* may also be present.

Minerotrophic indicator species are nearly always absent in this type, though in a few circumstances may be present at low cover. These circumstances include (but are not limited to) a stand that has experienced the impacts of recent beaver flooding or a stand that is adjacent to a lake shore. The most common minerotrophic species found in these situations are *Carex lacustris, Carex lasiocarpa, Eriophorum viridi-carinatum*, and *Betula pumila*.

Globally

Vegetation is dominated by an open dwarf-shrub/scrub conifer layer with very scattered trees (<10% cover). Microtopography is high hummocks with weakly developing hollows. Ericaceous dwarf-shrubs are dominant, including *Andromeda polifolia*, *Chamaedaphne calyculata, Kalmia polifolia*, and *Ledum groenlandicum*, and the creeping dwarf-shrub *Vaccinium oxycoccos*. Scrub conifers include *Larix laricina* and *Picea mariana*. They also occur as scattered trees (> 3m). The herb layer is species poor, containing *Carex oligosperma, Carex pauciflora, Eriophorum vaginatum*, and *Sarracenia purpurea*. The moss layer forms a continuous hummocky mat dominated by *Sphagnum angustifolium, Sphagnum fuscum*, and *Sphagnum magellanicum* (Minnesota 1993, Harris *et al.* 1996). Diagnostic features of this type include the dominance of a dwarf-shrub ericaceous layer, absence of a tree layer (<10%), species-poor herbaceous layer, and almost complete lack of minerotrophic indicators, such as *Betula pumila, Carex aquatilis*, and *Carex stricta*. A possible subtype may occur in which pools form near the bogs crests, and contain maritime species such as *Scheucherzia palustris, Rhynchospora alba, Sphagnum cuspidatum*, and *Utricularia cornata*.

CONSERVATION RANK G5.

DATABASE CODE CEGL002498

COMMENTS

Voyageurs National Park

Diagnostic features of the type include the dwarf-shrub layer dominated by *Chamaedaphne calyculata* with <10% cover of conifers. This type differs from the Black Spruce/Leatherleaf Semi-Treed Bog (CEGL005218) in the density of conifers, which for that type contain 10-25% cover. This type is analogous to Ontario's W24 (Harris *et al.* 1996). In cases with minerotrophic species present, stands are more analogous to W21, a Leatherleaf poor fen type. When scattered minerotrophic species are present, the Leatherleaf Bog can also grade into the Leatherleaf-Sweet Gale Shore Fen (CEGL005228). That type, however, has a greater consistent coverage of minerotrophic indicators (see VEGETATION DESCRIPTION) and is typically located near the lakeshore.

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

6.2 Northern Shrub and Graminoid Fens

Alnus incana - Salix spp. - Betula pumila / Chamaedaphne calyculata Shrubland (Bog Birch - Willow Shore Fen)

COMMON NAME	Speckled Alder - Willow species - Bog Birch / Leatherleaf Shrubland
SYNONYM	Bog Birch - Willow Shore Fen
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Saturated cold-deciduous shrubland (III.B.2.N.g)
ALLIANCE	BETULA PUMILA - (SALIX SPP.) SATURATED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type is found primarily in the northern part in association with peatland areas.

Globally

This association is found in northern Minnesota and Ontario and may be in Wisconsin and Michigan.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type is most commonly found along the minerotrophic margins of confined basin peatlands, associated with peatland lake shore complexes or as part of large peatlands. The substrate is deep fibric, Sphagnum peat. The water regime is saturated or, rarely, seasonally flooded. Hummock and hollow microtopography is well developed.

Globally

This type is most commonly found along the minerotrophic margins of confined basin peatlands, associated with peatland lakeshore complexes or on "lagg" zones at edges of peatlands where periodic exposure to flooding occurs from groundwater runoff. The substrate is deep fibric to mesic peat. The water regime is saturated to seasonally flooded. Hummock and hollow microtopography is well developed (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Betula pumila, Alnus incana, Salix* spp.
Short shrub	*Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex lacustris, Carex trisperma*
Nonvascular	*Sphagnum* spp.

Globally

Tall shrub	*Betula pumila, Alnus incana, Salix* spp.
Short shrub	*Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex lacustris, Carex trisperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Betula pumila, Alnus incana, Salix spp.

Globally

Betula pumila, Alnus incana, Salix spp.

VEGETATION DESCRIPTION

Voyageurs National Park

The shrub layer of this type is dominated by *Betula pumila*; however, *Alnus incana, Salix pyrifolia, Salix pedicellaris,* and *Salix petiolaris* are also commonly present, usually at lower cover. Shrubs are usually under 2m tall and coverage ranges from 30-90%. *Chamaedaphne calyculata* dominates the dwarf-shrub layer, with lesser amounts of *Ledum groenlandicum*, *Andromeda polifolia,* and *Kalmia polifolia* present at low cover or absent. Cover of these dwarf-shrubs is typically 70-90%. Often being shaded out by this dense dwarf-shrub layer, the cover of herbaceous plants is generally low (5-30%). The most abundant species are *Carex lacustris, Carex trisperma,* and *Maianthemum trifolium*. *Potentilla palustris, Calamagrostis canadensis, Carex chordorrhiza,* and *Eriophorum vaginatum* are also common at low density. The nonvascular strata is dominated by *Sphagnum magellanicum, Sphagnum angustifolium, Sphagnum centrale, Sphagnum girgensohnii*, and *Sphagnum fallax*. These species typically comprise 90-100% cover.

Globally

The shrub layer of this type is dominated by *Betula pumila*, with *Alnus incana* and *Salix* spp codominants (including *Salix pyrifolia, Salix planifolia, Salix pedicellaris*, and *Salix petiolaris*). Other less constant tall shrubs include *Cornus stolonifera* and *Rhamnus alnifolia*. Shrubs are typically 1.5 to 3 m tall and coverage ranges from 30-80%. *Chamaedaphne calyculata* dominates the dwarf-shrub layer, with lesser amounts of *Ledum groenlandicum, Andromeda polifolia, Kalmia polifolia, Rubus acaulis, Rubus idaeus* and *Rubus pubescens*. Cover of these dwarf-shrubs is typically 60-90%. The herbaceous layer is often shaded out by the dense dwarf-shrubs, and their cover is variable (20-60%). The most abundant species are *Carex lacustris, Carex leptalea, Carex rostrata, Carex trisperma, Maianthemum trilolium* and *Potentilla palustris*. Common, but less abundant, species include *Calamagrostis canadensis, Carex chordorrhiza, Carex lasiocarpa, Eriophorum vaginatum* and *Viola* spp. The nonvascular strata in northern Minnesota is dominated by *Sphagnum magellanicum, Sphagnum angustifolium, Sphagnum centrale, Sphagnum girgensohnii*, and *Sphagnum fallax*. These species typically comprise 90-100% cover (Harris *et al.* 1996, M. Smith personal communication 1999).

CONSERVATION RANK G?

DATABASE CODE CEGL005227

COMMENTS

Voyageurs National Park

Diagnostic features of the type include the shrubland dominated by *Betula pumila*, with *Alnus incana* and *Salix* spp. consistent at low cover. An ericaceous dwarf-shrub mix is usually present. When *Alnus incana* or *Salix* spp. increase in cover, this community can grade into the Speckled Alder Swamp (CEGL002381) and the Dogwood-Pussy Willow Swamp (CEGL002186). This occurs most commonly in shoreline situations. When alder, willow and bog birch all are present with equal cover, the stand is still considered a Bog Birch-Willow Shore Fen since mixed dominance is typical for this community. When alder or willow reach dominance (perhaps greater than 60% relative cover) the stand should be classified into either of those types. This type is analogous to Ontario's W16 (Harris *et al.* 1996).

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour. Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Chamaedaphne calyculata - Myrica gale / Carex lasiocarpa Dwarf-shrubland (Leatherleaf - Sweetgale Shore Fen)

COMMON NAME	Leatherleaf - Sweet Gale / Wiregrass Sedge Dwarf-shrubland
SYNONYM	Leatherleaf - Sweetgale Shore Fen
PHYSIOGNOMIC CLASS	Dwarf-shrubland (IV)
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland (IV.A)
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (IV.A.1.N)
FORMATION	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1.N.g)
ALLIANCE	CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type is localized in areas around the larger lakes in the park.

Globally

This association is found in northern Minnesota, and may be in northern Michigan, northern Wisconsin, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occupies peatland sites that receive minerotrophic influence from lake water. They can occur right up to the water's edge or be separated from the water by another community, typically a shallow marsh. When they exist up to the water's edge, the peat may be floating. The mat usually becomes grounded as it approaches the shore. Hummock and hollow microtopography is usually well developed. Standing water may or may not be present in the hollows. This community can occasionally occur independent of lake water influence if another source of mineral rich water is available. Substrate is deep, fibric, Sphagnum peat. The water regime is seasonally flooded to saturated.

Globally

This community is typically found on floating mats on the edges of lakes and streams, with localized shallow surface pools that may persist throughout the growing season. Stands occur where there is low wave and current energy with seasonal flooding. The water regime is otherwise saturated (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Betula pumila, Alnus incana, Salix* spp.
Short shrub	*Myrica gale, Chamaedaphne calyculata,*
Graminoid	*Carex lacustris, Carex lasiocarpa, Eriophorum vaginatum*, Typha spp.
Nonvascular	*Sphagnum magellanicum, Sphagnum fuscum, Sphagnum angustifolium, Sphagnum recurvum sensu stricta*

Globally

Stratum	Species
Short shrub	*Chamaedaphne calyculata, Myrica gale*
Graminoid	*Carex lasiocarpa*

CHARACTERISTIC SPECIES

Voyageurs National Park

Myrica gale, Betula pumila, Alnus incana, Salix spp., *Chamaedaphne calyculata,Carex lacustris, Carex lasiocarpa,*

Eriophorum vaginatum

Globally
Myrica gale, Chamaedaphne calyculata, Carex lasiocarpa

VEGETATION DESCRIPTION
Voyageurs National Park
A short shrub layer with low to moderate cover is often present, with *Myrica gale, Betula pumila, Alnus incana, Salix petiolaris*, and *Salix pedicellaris* the most abundant shrubs. *Chamaedaphne calyculata* is usually present at 80-100% cover but may be mixed with lesser amounts of the dwarf-shrubs *Andromeda polifolia* and *Vaccinium oxycoccos*. In addition to bog plants such as *Eriophorum vaginatum* and *Drosera rotundifolia*, other minerotrophic indicators are also present at 10-40% cover. These include *Carex lacustris, Carex lasiocarpa, Typha latifolia, Calamagrostis canadensis,* and *Iris versicolor.* Occasionally, herbaceous cover may reach 90%. A continuous carpet of peat moss includes species such as *Sphagnum magellanicum, Sphagnum recurvum sensu stricta, Sphagnum angustifolium,* and *Sphagnum subsecundum sensu lato*.

Globally
Low shrubs dominate the stands, generally over 60%. Dominant species include *Chamaedaphne calyculata* and *Myrica gale*. *Salix pedicillaris* is often present. The herbaceous layer is variable in cover and composition, sometimes shaded out by the heavy shrub cover. Species include *Calamagrostis canadensis, Carex aquatilis, Carex lasiocarpa, Carex rostrata*, and *Potentilla palustris* (Harris *et al.* 1996). In northern Minnesota a short shrub layer with low to moderate cover is often present, with *Myrica gale, Betula pumila, Alnus incana, Salix petiolaris*, and *Salix pedicellaris* the most abundant shrubs. In the dwarf-shrub layer *Chamaedaphne calyculata* is usually present at 80-100% cover but may be mixed with lesser amounts of *Andromeda polifolia* and *Vaccinium oxycoccos*. In addition to bog plants such as *Eriophorum vaginatum* and *Drosera rotundifolia*, other minerotrophic indicators are also present at 10-40% cover. These include *Carex lacustris, Carex lasiocarpa, Typha latifolia, Calamagrostis canadensis,* and *Iris versicolor.* Occasionally, herbaceous cover may reach 90%. A continuous carpet of peat moss includes species such as *Sphagnum magellanicum, Sphagnum recurvum sensu stricta, Sphagnum angustifolium,* and *Sphagnum subsecundum sensu lato* (M. Smith personal communication 1999).

CONSERVATION RANK G?.

DATABASE CODE CEGL005228

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the high cover of *Chamaedaphne calyculata* with one or more of the following minerotrophic species present: *Myrica gale, Betula pumila, Salix* spp., *Carex lacustris, Carex lasiocarpa Typha latifolia, Calamagrostis canadensis,* and *Iris versicolor.* Depending on the site, this community includes poor, intermediate and rich fens. This type is analogous to Ontario's W15 (Harris *et al.* 1996). This type differs from the Leatherleaf Bog (CEGL002498) in that it harbors minerotrophic indicator species that the Leatherleaf Bog lacks. When cover of *Betula pumila* and *Salix* spp. increases, this community can grade into a Bog Birch-Willow Shore Fen (CEGL005227) or a Dogwood-Pussy Willow swamp (CEGL002186). Greater than 25% cover of short (not dwarf) shrubs would warrant placing the stand into one of these other communities.

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Larix laricina - Betula pumila / Chamaedaphne calyculata Shrubland (Tamarack Scrub Poor Fen)

COMMON NAME	Tamarack - Bog Birch / Leatherleaf Shrubland
SYNONYM	Tamarack Scrub Poor Fen
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Saturated cold-deciduous shrubland (III.B.2.N.g)
ALLIANCE	BETULA PUMILA - (SALIX SPP.) SATURATED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

It is not know for sure whether this type occurs in the park. It may occur in the Rat Root River peatlands.

Globally

This association is found in Minnesota and probably Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Globally

Stands that occur on the margins of water tracks, generally being less mineral rich and having greater cover of tamarack, are most likely to contain the habitat for this type.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species

Globally

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

VEGETATION DESCRIPTION

Voyageurs National Park

Globally

The type concept is that of a scrub poor fen, where tree height does not exceed 2 m. The type has been defined by the Minnesota Natural Heritage Program type as the "poor fen, scrub tamarack subtype" (MN HP 1993). Range-wide review is still needed, and type does not clearly match any type in Harris *et al.* (1996), but comes closest to the poor fen: ericaceous shrub/ wire sedge / Sphagnum type (W20).

CONSERVATION RANK

DATABASE CODE CEGL005226

COMMENTS

Voyageurs National Park

This type may or may not occur in the Rat Root River Peatlands in and near Voyageurs. Stands that occur in the water tracks of the large peatland have been labelled as Northern Sedge Poor Fen (CEGL002265). They are

analagous to Ontario's W19 and W20 (Harris *et al.* 1996). Those that occur on the margins of water tracks, generally being less mineral rich and having greater cover of tamarack, are floristically most similar to the Tamarack Scrub Poor Fen type, which is somewhat analagous to Ontario's W20. Part of the difficulty is resolving how much of the tamarack is scrub (< 3m tall) vs tree (> 3 m tall) from an aerial vs ground perspective. The wetter phase of this type occurs in the water tracks, is more clearly graminoid-dominated, and often contains standing water in the hollows.

REFERENCES

Betula pumila / Chamaedaphne calyculata / Carex lasiocarpa Shrubland (Bog Birch - Leatherleaf Poor Fen)

COMMON NAME	Bog Birch / Leatherleaf / Wiregrass Sedge Poor Fen Shrubland
SYNONYM	Bog Birch - Leatherleaf Poor Fen
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Saturated cold-deciduous shrubland (III.B.2.N.g)
ALLIANCE	BETULA PUMILA - (SALIX SPP.) SATURATED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type is only mapped in the Rat Root River peatland..

Globally

This association is found in Minnesota, Michigan, Wisconsin, Manitoba, Ontario, and possibly Maine.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Stands are found on the margins of water tracks of large peatlands (Harris *et al.* 1996).

Globally

Stands are found on the margins of water tracks of large peatlands, or in the interior of small basins that are relatively isolated from run-off (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Betula pumila, Alnus incana*, Salix spp.
Short shrub	*Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex lacustris, Carex trisperma*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Tall shrub	*Betula pumila, Alnus incana, Salix* spp.
Short shrub	*Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex lacustris, Carex trisperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Betula pumila, Alnus incana, Salix spp.

Globally

Betula pumila, Alnus incana, Salix spp.

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not visited at Voyaguers NP. The following description is based on information from northwesern

Ontaro. The shrub cover is at least 25%, dominated by a combination of *Betula pumila* and ericaceous shrubs, including *Andromeda polifolia, Chamaedaphne calyculata, Ledum groenlandicum*, and *Vaccinium oxycoccos*. Other minerotrophic shrubs include *Lonicera villosa, Rhamnus alnifolia, Rubus acaulis, Rubus pubescens*, and *Salix pedicellaris*. Scattered, small (2-10 m) tree stems of *Larix laricina, Picea mariana*, and *Thuja occidentalis* are present at low cover. There is a diverse forb, graminoid, and moss cover, at least in the richer examples of this type. The graminoids include *Carex chordorrhiza, Carex lasiocarpa, Carex leptalea*, and *Eriophorum viridi-carinatum*. Forbs include *Drosera rotundifolia, Equisetum fluviatile, Maianthemum trifolium, Menyanthes trifoliata, Potentilla palustris, Sarracenia purpurea*, and *Solidago uliginosa*. The moss layer contains *Aulacomnium palustre, Pleurozium schreberi, Sphagnum angustifolium*, and *Sphagnum capillifolium*. Less frequent are *Campylium stellatum, Sphagnum fuscum*, and *Tomenthypnum nitens* (Harris *et al.* 1996).

Globally

The shrub cover is at least 25%, dominated by a combination of *Betula pumila* and ericaceous shrubs, including *Andromeda polifolia, Chamaedaphne calyculata, Ledum groenlandicum*, and *Vaccinium oxycoccos*. Other minerotrophic shrubs include *Lonicera villosa, Rhamnus alnifolia, Rubus acaulis, Rubus pubescens*, and *Salix pedicellaris*. Scattered, small (2-10 m) tree stems of *Larix laricina, Picea mariana*, and *Thuja occidentalis* are present at low cover. There is a diverse forb, graminoid, and moss cover, at least in the richer examples of this type. The graminoids include *Carex chordorrhiza, Carex lasiocarpa, Carex leptalea*, and *Eriophorum viridi-carinatum*. Forbs include *Drosera rotundifolia, Equisetum fluviatile, Maianthemum trifolium, Menyanthes trifoliata, Potentilla palustris, Sarracenia purpurea*, and *Solidago uliginosa*. The moss layer contains *Aulacomnium palustre, Pleurozium schreberi, Sphagnum angustifolium*, and *Sphagnum capillifolium*. Less frequent are *Campylium stellatum, Sphagnum fuscum*, and *Tomenthypnum nitens* (Harris *et al.* 1996).

CONSERVATION RANK G4G5.

DATABASE CODE CEGL002494

COMMENTS

Voyageurs National Park

Stands in the Rat Root River peatland were mapped as this type, but not visited. Further field checks are necessary to determine how well they correspond to the expected composition of this type.

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Carex lasiocarpa - (Carex rostrata) - Equisetum fluviatile Herbaceous Vegetation (Wiregrass Sedge Shore Fen)

COMMON NAME	Wiregrass Sedge - (Beaked Sedge) - Water Horsetail Herbaceous Vegetation
SYNONYM	Wiregrass Sedge Shore Fen
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Saturated temperate or subpolar grassland (V.A.5.N.m)
ALLIANCE	CAREX LASIOCARPA SATURATED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type typically occurs inland from shores around the large lakes.

Globally

This association is found in northern Michigan, northern Minnesota, northern Wisconsin, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community occurs on floating or grounded mats of peat near the shores of the large lakes. Typically, the peat mat near the edge of open water is floating and can be thin. The mat becomes grounded as it gets closer to the shore. The peat is commonly a fibric sedge peat, though fibric *Sphagnum* peat can occasionally be found in layers below the sedge peat. Standing water 20-50 cm deep is usually present throughout the year in these stands. Most of these stands are located in areas sheltered from extreme wave action and have very little microtopography. The water regime is permanently flooded to intermittently exposed.

Globally

This community occurs on floating or grounded mats of peat near the shores of the large lakes. Typically, the peat mat near the edge of open water is floating and can be thin. The mat becomes grounded as it gets closer to the shore. The peat is commonly a fibric sedge peat, though fibric *Sphagnum* peat can occasionally be found in layers below the sedge peat. Standing water 20-50 cm deep seasonally floods these stands. Most of these stands are located in areas sheltered from extreme wave action and have very little microtopography. The water regime is seasonally flooded to saturated (Harris *et al.* 1996, M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Fern	*Equisetum fluviatile*
Graminoid	*Carex lasiocarpa*

Globally

Stratum	Species
Fern	*Equisetum fluviatile*
Graminoid	*Carex lasiocarpa*

CHARACTERISTIC SPECIES

Voyageurs National Park

Carex lasiocarpa, Equisetum fluviatile

Globally

Carex lasiocarpa, Carex rostrata, Equisetum fluviatile

VEGETATION DESCRIPTION

Voyageurs National Park

The Wiregrass Sedge Shore Fen is characterized by a continuous cover of *Carex lasiocarpa*. This community is typically species poor, with some stands harboring as few as four species. Along with *Carex lasiocarpa*, *Equisetum fluviatile* is often found at high density. The following herbs are also common, but usually exist at low cover: *Acorus calamus, Polygonum hydropiper, Cicuta bulbifera, Lysimachia terrestris, Calamagrostis canadensis,* and *Carex rostrata*. Few, scattered shrubs of *Chamaedaphne calyculata* may be present. In stands that have standing water, submerged aquatic plants may also be found, including *Utricularia intermedia* and *Potamogeton natans*. The moss, *Warnstorfia exannulata* is also frequent in standing water in this community, though at low density.

Globally

Graminoids dominate the stand, with shrub cover typically much less than 25%. *Carex lasiocarpa* can form extensive "lawns". Other species present include *Carex rostrata, Equisetum fluviatile, Potentilla palustris, Triadenum fraseri, Utricularia intermedia,* and *Utricularia vulgaris*. *Menyanthes trifoliata* can occur at high cover, especially at the outer edge of the floating mat. Permanent surface pools and small hummocks with *Sphagnum* spp. and ericaceous shrubs may be present. The substrate is a mat of fibric to mesic peat held together by roots and rhizomes (Harris *et al.* 1996).

CONSERVATION RANK G?.

DATABASE CODE CEGL005229

COMMENTS

Voyageurs National Park

Diagnostic features of the type include an herbaceous layery with greater than 70% cover of *Carex lasiocarpa.* Overall, this community is most similar to the Northern Sedge Wet Meadow (CEGL002257) but can easily be distinguished by its dominance of *Carex lasiocarpa* and its restriction to the shores of the large lakes. This type is analogous to Ontario's W14 (Harris *et al.* 1996). Spatially, this community is often located near the Midwest Cattail Marsh (CEGL002233), the Northern Sedge Wet Meadow (CEGL002257), and/or the Water Horsetail Marsh (CEGL005258) and, compositionally, may grade into any of them. Typically, as the peat mat gets closer to shore, it becomes more dominated by *Sphagnum* spp. and more well developed. At this point, other species, especially shrubs, colonize it and the community may grade into a Leatherleaf-Sweetgale Shore Fen (CEGL005228), a Dogwood-Pussy Willow Swamp (CEGL002186) or a Bog Birch-Willow Shore Fen (CEGL005227). Floristically, this community is also similar to the Northern Sedge Poor Fen (CEGL00265) in that both are dominated by *Carex lasiocarpa.* The Northern Sedge Poor Fen, however, usually has a significant cover of *Sphagnum* spp. and *Chamaedaphne calyculata* and is found only in the Rat Root Peatland.

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Carex lasiocarpa - Carex oligosperma / Sphagnum spp. - Polytrichum spp. Herbaceous Vegetation (Northern Sedge Poor Fen)

COMMON NAME	Wiregrass Sedge - Few-seed Sedge / Peatmoss species Herbaceous Vegetation
SYNONYM	Northern Sedge Poor Fen
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Saturated temperate or subpolar grassland (V.A.5.N.m)
ALLIANCE	CAREX OLIGOSPERMA - CAREX LASIOCARPA SATURATED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type occurs in and around water tracks of the Rat Root Peatland.

Globally

Isolated stands can occur in central/southern Minnesota, Wisconsin, Michigan, and even northern Iowa and Illinois. This community also is found in Manitoba, Ontario, and possible North Dakota.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Northern Poor Fen occurs in and around water tracks of large peatlands. In the wetter, more minerotrophic phase, microtopography consists of wet hollows with scattered hummocks. In the drier phase, hummock and hollow microtopography is more well developed. The substrate is deep, fibric Sphagnum peat. The water regime is saturated.

Globally

Stands are found in peatlands with low exposure to mineral-rich groundwater, including basin fens, shores above the level of seasonal flooding and larger peatlands. Water hydrology is saturated (Harris *et al.* 1996). The surface water is slightly acidic (pH 4.1-5.9) and nutrient poor [calcium < 13 mg/l) (MN NHP 1993).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Larix laricina*
Short shrub	*Chamaedaphne calyculata, Andromeda polifolia*
Graminoid	*Carex lasiocarpa*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Short shrub	*Chamaedaphne calyculata, Andromeda polifolia*
Graminoid	*Carex lasiocarpa, Carex oligosperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Carex lasiocarpa

Globally

Carex lasiocarpa

VEGETATION DESCRIPTION

Voyageurs National Park
The Northern Poor Fen is dominated by 80-100% cover of *Carex lasiocarpa*. Short, stunted *Larix laricina* trees, usually under 2 m tall, are present above the herbaceous layer at less than 10% cover. Dwarf-shrubs, most commonly *Chamaedaphne calyculata* and *Andromeda polifolia*, may be present at less than 40% cover and, in wetter stands, occupy only the drier hummocks. The dwarf-shrubs *Kalmia polifolia, Betula pumila,* and *Vaccinium oxyccocus* may also be present at low density. In addition to *Carex lasiocarpa*, common herbs include *Maianthemum trifolium, Menyanthes trifolia, Equisetum fluviatile, Drosera rotundifolia,* and *Sarricenia purpurea*. Stands of this type that occur in water tracks tend to be more mineral rich and may also contain *Pogonia ophioglosoides, Carex livida,* and *Utricularia intermedia*. Sphagnum moss typically forms a continuous carpet, though in wetter stands may be intermixed with brown mosses. The most abundant species are *Sphagnum magellanicum, Sphagnum angustifolium, Sphagnum subsecundum sensu lato,* and *Warnstorfii exanulata*.

Globally
The vegetation is dominated by graminoids, with up to 25% shrub cover, and scattered trees. The dominant graminoid is *Carex lasiocarpa*, and typical associates include *Carex chordorrhiza, Carex limosa, Carex oligosperma, Rhynchospora alba, Scirpus cespitosus*, and *Scheuchzeria palustris*. Forbs include *Sarracenia purpurea*. The low shrub layer contains *Andromeda polifolia, Betula pumila, Chamaedaphne calyculata, Larix laricina, Salix discolor, Salix pedicillaris*, and *Vaccinium oxycoccos*. The moss layer is virtually continuous, and is dominated by *Sphagnum capillifolium, Sphagnum fuscum*, and *Sphagnum magellanicum* (Chapman *et al.* 1989, MN NHP 1993, Harris *et al.* 1996).

CONSERVATION RANK G3G4.

DATABASE CODE CEGL002265

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the continuous cover of *Carex lasiocarpa* and low coverage of *Larix laricina* (less than 25%). Stands that occur in the water tracks are most similar to Ontario's W19 (Harris *et al.* 1996). Those that occur on the margins of water tracks, generally being less mineral rich and having greater cover of tamarack, are floristically most similar to W20.

The wetter phase of this type occurs in the water tracks and often contains standing water in the hollows. The drier phase usually lacks standing water, has greater cover of *Larix laricina* and has a more well developed shrub layer. When cover of *Larix laricina* increases, this community can grade into the Northern Tamarack Poor Swamp. The Northern Tamarack Poor Swamp, however, generally contains a greater cover of *Betula pumila*, is less mineral rich and is drier.

The Wiregrass Sedge Shore Fen is also dominated by *Carex lasiocarpa* but is not found in the Rat Root Peatland and typically lacks *Larix laricina*.

REFERENCES
Chapman, K. A., D. A. Albert, and G. A. Reese. 1989. Draft descriptions of Michigan's natural community types. Michigan Department of Natural Resources, Lansing, MI. 35 pp.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p

.

6.3 Wet Meadows

Calamagrostis canadensis Eastern Herbaceous Vegetation [Provisional] (Canada Bluejoint Eastern Meadow)

COMMON NAME	Canada Reedgrass Eastern Herbaceous Vegetation
SYNONYM	Canada Bluejoint Eastern Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type occurs predominately in old beaver meadows or along slow moving streams throughout the park.

Globally

This association is widespread throughout the eastern United States and adjacent southern Canada.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs predominately in old beaver meadows or along slow moving streams. In beaver meadows, this community is found on relatively dry sites and often occurs on the upland edge of more recent beaver floodings or completely colonizing older, drier beaver meadows. Soils usually contain deep, dense clay which prevents or slows drainage. A shallow layer of mineral soil or well decomposed peat may occur over the clay. In wetter conditions of this type, standing water may be present in low areas. In these situations, tussocky microtopography is often present. Water channels and standing or fallen dead trees are frequently present. The water regime is temporarily to seasonally flooded.

Globally

Stands occur on the floodplains of small streams, in poorly drained depressions, beaver meadows, and lakeshores. Soils are typically mineral soil or well-decomposed peat, with a thick root mat (Harris *et al.* 1996). In northern Minnesota, the water regime varies between temporarily and seasonally flooded (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Graminoid	*Calamagrostis canadensis*

Globally

Stratum	Species
Short shrub	*Alnus incana*
Graminoid	*Calamagrostis canadensis, Scirpus cyperinus, Carex rostrata, Carex stricta*
Forb	*Eupatorium maculatum*

CHARACTERISTIC SPECIES

Voyageurs National Park

Calamagrostis canadensis

Globally

Calamagrostis canadensis, Scirpus cyperinus, Carex rostrata, Carex stricta, *Eupatorium maculatum*

VEGETATION DESCRIPTION

Voyageurs National Park

This community is characterized by a continuous herbaceous cover of *Calamagrostis canadensis*. *Alnus incana, Betula pumila,* or *Salix* spp. infrequently colonize these sites at <25% cover. Other herbaceous species are usually present but typically make up very little cover. These often include *Scirpus cyperinus, Carex lacustris, Eupatorium maculatum, Typha latifolia,* and *Campanula aparinoides*. Some stands are very species poor and contain as few as three species. This occurs when *Calamagrostis canadensis* cover is very dense and a thick thatch layer accumulates. Water channels occasionally occur within these stands and can contain species typical of wetter conditions, including *Calla palustris, Cicuta bulbifera,* and *Sagittaria* spp.

Globally

Graminoid cover is typically dense, and can form hummocky microtopography. *Calamagrostis canadensis* dominates, often in almost pure stands or with tall sedges, such as *Carex aquatilis, Carex lacustris, Carex rostrata*, and *Carex stricta*. In fen transitions, *Carex lasiocarpa* can be present. *Glyceria grandis, Poa palustris, Scirpus cyperinus*, and *Typha latifolia* are sometimes abundant. Forbs include *Campanula aparinoides, Epilobium leptophyllum, Eupatorium maculatum, Iris versicolor, Polygonum amphibium*, and *Potentilla palustris* (Harris *et al.* 1996).

CONSERVATION RANK G?.

DATABASE CODE CEGL005174

COMMENTS

Voyageurs National Park

Diagnostic features of the type include a herbaceous layer with continuous cover of *Calamagrostis canadensis*. This type is analogous to Ontario's W13 (Harris *et al.* 1996). This community often occurs adjacent to, and readily grades into the Northern Sedge Wet Meadow (CEGL002257). The Northern Sedge Wet Meadow usually occurs in the wetter areas of beaver meadows. The Bluejoint Eastern Meadow can also, though more rarely, grade into the Midwest Cattail Marsh (CEGL002233). The Speckled Alder Swamp (CEGL002381) and the Dogwood-Pussy Willow Swamp (CEGL002186) can occasionally invade a Bluejoint Eastern Meadow site. In these circumstances, a shrub layer of > 25% cover distinguish these shrub communities from the Bluejoint Eastern Meadow.

The Bluejoint Eastern Meadow most commonly occurs in beaver meadows. Constant beaver activity can alter local hydrology and, over time, cause this community to grade into other communities.

Globally

In northern Minnesota, this type commonly occurs in beaver meadows. Constant beaver activity can alter local hydrology and, over time, cause this community to grade into other communities (M. Smith personal communication 1999).

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Carex (rostrata, utriculata) - Carex lacustris - (Carex vesicaria) Herbaceous Vegetation (Northern Sedge Wet Meadow)

COMMON NAME	Swollen-beak Sedge - Hairy Sedge - (Inflated Sedge) Herbaceous Vegetation
SYNONYM	Northern Sedge Wet Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type occurs in beaver meadows, along lake shores and slow moving streams, and in isolated basins throughout the park.

Globally

This association is found in Iowa, Michigan, Minnesota, Wisconsin, Manitoba, Ontario, and possibly North and South Dakota.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community type occurs in beaver meadows, along lake shores, along slow moving streams and in isolated basins. Substrate is most often deep sedge peat under various stages of decomposition, or shallow (5-10 cm) peat over clay. A thick thatch layer over the peat may be present. The peat mat may occasionally be floating. Standing dead trees, especially in beaver meadows, are common. Hummock and hollow microtopography is usually well developed. Standing water is common in the hollows. The water regime is highly variable, ranging from saturated to permanently flooded.

Globally

Sites are found on floodplains, shallow bays of lakes and streams, beaver meadows, ditches, and occasionally in isolated basins, or on semi-floating mats. Hydrology is seasonally to semipermanently flooded. Substrate is mineral soil or well-decomposed peat (Curtis 1959, Harris *et al.* 1996). Standing dead trees, especially in beaver meadows, are common. Hummock and hollow microtopography is usually well developed, with standing water often in the hollows. The water regime is highly variable, ranging from saturated to permanently flooded (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Graminoid	*Carex lacustris, Carex vesicaria, Carex rostrata*

Globally

Stratum	Species
Graminoid	*Carex rostrata, Carex lacustris, Calamagrostis canadensis*
Forb	*Eupatorium maculatum*

CHARACTERISTIC SPECIES

Voyageurs National Park

Carex rostrata, Carex lacustris, Carex vesicaria

Globally

Carex rostrata, Carex lacustris, Carex vesicaria, Eupatorium maculatum

VEGETATION DESCRIPTION

Voyageurs National Park

Northern Sedge Wet Meadow is most commonly dominated by *Carex lacustris* with *Carex rostrata, Carex vesicaria, Calamagrostis canadensis, Typha* spp., *Calla palustris* and/or *Scirpus cyperinus* often present at low cover. In some circumstances, *Carex rostrata* and/or *Carex vesicaria* may share dominance with *Carex lacustris* or obtain complete dominance. Cover of this herbaceous layer is usually 90-100%. Shrubs of *Alnus incana, Chamaedaphne calyculata,* or *Salix* spp. may be found at low cover (<25%). Stands with standing water or water channels running through them may contain species typical of wetter conditions like *Brasenia schreberi* or *Potamogeton* spp. In most circumstances, the moss layer is virtually absent. In the uncommon cases where sedges are colonizing a peatland, however, the moss strata can be 20-90% cover of *Sphagnum* spp.

Globally

Tall coarse-leaved sedges dominate the vegetation layer, often creating a tussocky hummock microtopography. Shrubs can cover up to 25% of the area. Pools with submergents may also be present. Dominant graminoids include a number of Carices, including *Carex aquatilis, Carex lacustris, Carex lasiocarpa, Carex rostrata, Carex vesicaria*, and locally *Carex stricta*. Other graminoids include *Calamagrostis canadensis, Scirpus atrovirens, Scirpus cyperinus*, and, in wetter areas, *Eleocharis smallii* and *Equisetum fluviatile*. Forbs include *Acorus calamus, Aster simplex, Campanula aparinoides, Eupatorium maculatum, Iris shrevei, Lycopus uniflorus, Poa palustris, Polygonum amphibium, Potentilla palustris*, and others (Curtis 1959, Harris *et al.* 1996). Stands with standing water or water channels running through them may contain species typical of wetter conditions like *Brasenia schreberi* or *Potamogeton* spp. In most circumstances, the moss layer is virtually absent. In the uncommon cases where sedges are colonizing a peatland, however, the moss strata can be 20-90% cover of *Sphagnum* spp. (M. Smith personal communication 1999).

CONSERVATION RANK G4G5Q.

DATABASE CODE CEGL002257

COMMENTS

Voyageurs National Park

Diagnostic features of the type are greater than 40% cover of *Carex lacustris, Carex rostrata*, and/or *Carex vesicaria*. It is analogous to Ontario's W12 (Harris *et al.* 1996). The sedges in this community can occasionally occur mixed with *Typha* spp. and *Calamagrostis canadensis*, grading into the Midwest Cattail Marsh and the Eastern Bluejoint Marsh respectively. When *Carex* spp. occurs mixed with *Typha* spp., there must be >60% cover of cattails for the stand to be considered a Midwest Cattail Marsh. Up to this point, the stands usually retain more characteristics of a Northern Sedge Wet Meadow than of a Midwest Cattail Marsh. When *Carex* spp. are mixed with *Calamagrostis canadensis*, the dominant species (or genera) will determine the appropriate community. Occasionally, a Speckled Alder Swamp or other shrub type may invade over a Northern Sedge Wet Meadow. In these circumstances, the shrubs must obtain greater than 25% cover for the stand to be considered a shrub type.

Stands dominated by *Carex lasiocarpa* are not included here. See Wiregrass Sedge Shore Fen or Northern Poor Fen

This community is subject to disturbance by beaver activity. In recently flooded beaver ponds, small patches of Northern Sedge Wet Meadow may occur interspersed with small patches of Northern Water Lily Aquatic Wetland. The Northern Sedge Wet Meadow tends to be intermediate in moisture tolerance between the wetter Midwest Cattail Marsh and the drier Eastern Bluejoint Marsh.

REFERENCES

Curtis, J. T. 1959. The vegetation of Wisconsin: An ordination of plant communities. Univ. of Wisconsin Press, Madison. 657 p.

Damman, A.W.H. and T.W. French. 1987. The ecology of peat bogs of the glaciated northeastern United States: a community profile. U.S. Fish and Wildlife Service Biological Report 85(7.16). 100 pp.

Gleason, H.A. and A. Cronquist. 1991. Manual of vascular plants of northeastern United States and adjacent Canada. New York Botanical Garden, Bronx, NY. 910 pp.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Mohlenbrock, R. H. and D. M. Ladd. 1978. Distribution of Illinois vascular plants. Southern Illinois Univ. Press, Carbondale. 282 p.

Ownbey, G.B. and T. Morley. 1991. Vascular Plants of Minnesota: A Checklist and Atlas. University of Minnesota Press. Minneapolis.

Voss, E.G. 1972. Michigan Flora, Part I. Gymnosperms and Monocots. Cranbrook Institute of Science, Bloomfield Hills Bull., No. 55.

6.4 Marshes

Phragmites australis Semipermanently Flooded Ruderal Herbaceous Vegetation (Eastern Reed Marsh)

COMMON NAME	Common Reed Semipermanently Flooded Ruderal Herbaceous Vegetation
SYNONYM	*Eastern **Reed Marsh***
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	PHRAGMITES AUSTRALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type is restricted to shorelines of the large lakes and islands in the park.

Globally

This association is widespread throughout the eastern United States.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Stands occur on large lakes, most often on fairly wave exposed sites on sand bars or shallow areas adjacent to islands. The substrate is typically sand or, in some cases, clay or peat over clay. The density of *Phragmites australis* tends to be inversely related to water depth with the deeper stands having as much as 60% open water. Most sites contain 0.25 - 1 m standing water. The water regime is permanently flooded to intermittently exposed.

Globally

Stands are found in semipermanently flooded marshes, ditches, impoundments, and other disturbed aquatic systems, as well as lake shorelines.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Graminoid	*Phragmites australis*

Globally

Stratum	Species
Graminoid	*Phragmites australis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Phragmites australis

Globally

Phragmites australis

VEGETATION DESCRIPTION

Voyageurs National Park

The Reed Marsh community is composed primarily, and sometimes solely, by one species: *Phragmites australis*. The density of *Phragmites australis* in the Reed Marsh is highly variable. In deep water (1-1.5 m deep), it can be as low as 40% whereas in shallow water (0-1 m) it is commonly 100%. The Reed Marsh Community typically consists of very few species. In most cases one or more of the following species may be present at low (0-15%) cover:

Polygonum lapathifolium, Polygonum punctatum, Typha spp*., Acorus calamus, Calamagrostis canadensis, Carex rostrata, Scirpus acutus,* and/or *Scirpus tabernaemontani*. In addition, a wide variety of submerged aquatic plants (see Midwest Pondweed Submerged Aquatic Wetland) may be found if the site has standing water. These submerged aquatics often float in from other areas but are rarely found rooted within the Reed Marsh community because of the high wave energy.

Globally
This community is composed primarily, and sometimes solely, by one species: *Phragmites australis*. The density of *Phragmites australis* is highly variable: in deep water (1-1.5 m deep), it can be as low as 40% whereas in shallow water (0-1 m) it is commonly 100%. Typically, few other species are present. In Northern Minnesota, one or more of the following species may be present at low (0-15%) cover: *Polygonum lapathifolium, Polygonum punctatum, Typha* spp*., Acorus calamus, Calamagrostis canadensis, Carex rostrata, Scirpus acutus,* and/or *Scirpus tabernaemontani*. In addition, a wide variety of submerged aquatic plants may be found if the site has standing water. These submerged aquatics often float in from other areas but are rarely found rooted within this community (M. Smith personal communication 1999).

CONSERVATION RANK GW.

DATABASE CODE CEGL004141

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the herbaceous community dominated solely by *Phragmites australis*. This type is analogous to Ontario's W8 (Harris *et al.*1996).

Phragmites australis is a cryptogenic species which has become somewhat invasive in wetlands further south. Its presence in Voyageurs seems to be limited to relatively small stands in flooded areas of the large lakes.

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Nelson, J. B. 1986. The natural communities of South Carolina: Initial classification and description. S. C. Wildl. Mar. Resour. Dep., Div. Wildl. Freshwater Fish. Columbia, S. C. 55 p.

Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina. Third approximation. N.C. Dep. Environ., Health, Nat. Resour., Div. Parks and Recreation, Nat. Heritage Prog. Raleigh. 325 p.

Scirpus acutus - (Scirpus fluviatilis) Freshwater Herbaceous Vegetation (Freshwater Bulrush Marsh)

COMMON NAME	Hardstem Bulrush - (River Bulrush) Freshwater Herbaceous Vegetation
SYNONYM	Freshwater Bulrush Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	SCIRPUS ACUTUS - (SCIRPUS TABERNAEMONTANI) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type occurs on sheltered to moderately wave exposed sites, primarily on the large lakes.

Globally

This community is found in Iowa, Minnesota, South Dakota, North Dakota, southern Manitoba, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Freshwater Bulrush Marsh occurs on sheltered to moderately wave exposed sites, primarily on the large lakes. Water depth is typically 0.5-1.5 meters and substrate is clay, muck or sand. The water regime is permanently flooded.

Globally

This community is found on wetland sites that are flooded for most or all of the growing season. Weaver (1960) found abundant *Scirpus acutus* in water 0.3-1.6 m deep. Soils are usually mostly mineral but can contain significant organic matter (Harris *et al.* 1996). Dix and Smeins (1967) found the soils to be humic gleys and mucks in North Dakota, while in northwestern Ontario this community is favored on sandy substrates (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Graminoid	*Scirpus tabernaemontani, Scirpus acutus, Scirpus fluviatilis*

Globally

Stratum	Species
Graminoid	*Scirpus tabernaemontani, Scirpus acutus, Scirpus fluviatilis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Scirpus tabernaemontani, Scirpus acutus, Scirpus fluviatilis

Globally

Scirpus tabernaemontani, Scirpus acutus, Scirpus fluviatilis

VEGETATION DESCRIPTION

Voyageurs National Park

This community is dominated by *Scirpus tabernaemontani, Scirpus acutus* and, to a lesser extent, *Scirpus fluviatilis*. Cover of these dominants is typically 50-90%, though in rare cases may be much lower. Floating leaf aquatics may be present at low cover, especially *Nuphar variegatum, Nymphaea odorata, Lemna minor,* and *Lemna trisulca*. Submerged aquatics may also be present at low cover and include *Potamogeton zosteriformis, Potamogeton*

richardsonii, Potamogeton friesii, Myriophyllum sibiricum, and *Utricularia vulgaris*.

Globally
Tall hydrophytic graminoids, particularly *Scirpus acutus* and *Scirpus fluviatilis*, dominate the vegetation. These two species may grow taller that 2-m (Weaver 1960) and sometimes nearly exclude other species. Other species that can be present to common include *Carex atherodes* (especially in the shallower parts of the community), *Lemna* spp., *Scirpus tabernaemontani, Typha latifolia*, and *Utricularia macrorhiza*. *Scirpus tabernaemontani* can be a co-dominant in places. Floating leaved and submergent plants have low cover (Harris *et al.* 1996). This community often occurs as dense stands with interspersed channels or pools of open water.

CONSERVATION RANK G4G5.

DATABASE CODE CEGL002225

COMMENTS
Voyageurs National Park
Diagnostic features of the type are *Scirpus validus, Sciipus acutus,* and *Scirpus fluviatilis*. It is analogous to Ontario's W7 (Harris *et al.* 1996).

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Typha spp. Midwest Herbaceous Vegetation (Midwest Cattail Deep Marsh)

COMMON NAME	Cattail species Midwest Herbaceous Vegetation
SYNONYM	Midwest Cattail Deep Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type is found in 0.25 - 1 m of water along the shores of lakes.

Globally

This association is found in Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, and Wisconsin. It is likely in southern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Midwest Cattail Marsh most commonly occurs from 0.25 - 1 m of water along the shores of lakes. Wave exposure is low to moderate and substrate is clay, sand or muck. In more isolated sites, a floating mat may develop. This community can also occur in beaver floodings and low areas surrounded by upland. In these cases, substrate is usually well decomposed peat and the water regime is permanently to temporarily flooded. Open water is common in both circumstances.

Globally

Stands commonly occur in water depths of 0.5 - 2 m of water along the shores of lakes, ponds, and rivers. Wave exposure is low to moderate and substrate is clay, sand or muck. In more isolated sites, a floating mat may develop. This community can also occur in beaver floodings and low areas surrounded by upland. In these cases, substrate is usually well decomposed peat and the water regime is permanently to temporarily flooded. Open water is common in both circumstances.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Graminoid	*Typha latifolia, Typha angustifolia*

Globally

Stratum	Species
Graminoid	*Typha latifolia, Typha angustifolia*

CHARACTERISTIC SPECIES

Voyageurs National Park

Typha latifolia, Typha angustifolia

Globally

Typha latifolia, Typha angustifolia

VEGETATION DESCRIPTION

Voyageurs National Park

This herbaceous community can be colonized almost exclusively by *Typha angustifolia* and *Typha latifolia* or, less frequently, by a mix of *Typha* spp. and other graminoids. Near monocultures with coverage of 80-100% of *Typha*

spp. are common. Other species that may be present (usually at low cover) include: *Phragmites australis, Scirpus acutus, Scirpus tabernaemontani, Calamagrostis canadensis, Sium suave, Polygonum lapathifolium, Sagittaria cuneata,* and *Sagittaria latifolia*. In cattail stands located on the shores of a lake, it is common to find one or more of the following aquatic species at low density: *Ceratophyllum demersum, Lemna minor, Lemna trisulca, Myriophyllum sibiricum, Utricularia vulgaris*, and *Potamogeton* spp.

Globally
The vegetation is dominated by relatively pure stands of *Typha* spp., either *Typha latifolia* or *Typha angustifolia* or both. Many associates could occur. Less frequently, stands contain a mix of *Typha* spp. and other graminoids. Other species that may be present (usually at low cover) include: *Phragmites australis, Scirpus acutus, Scirpus tabernaemontani, Calamagrostis canadensis, Sium suave, Polygonum lapathifolium, Sagittaria cuneata,* and *Sagittaria latifolia*. In cattail stands located on the shores of a lake, it is common to find one or more of the following aquatic species at low density: *Ceratophyllum demersum, Lemna minor, Lemna trisulca, Myriophyllum sibiricum, Utricularia vulgaris*, and *Potamogeton* spp.

CONSERVATION RANK G5.

DATABASE CODE CEGL002233

COMMENTS
Voyageurs National Park
The diagnostic feature of this herbaceous community is a continuous cover of *Typha latifolia, Typha angustifolia* or *Typha X glauca.* Temporarily flooded or saturated cattail marshes found in shallow basins are floristically quite different from those along the shores of lakes and may represent a sub-type. Insufficient data exist to determine the relationship between these two situations. This association is analogous to Ontario's W11 (Harris *et al.* 1996). Cattail stands along the shores of the lakes often contain little else other than cattail and are therefore difficult to confuse with any other type. When they exist in drier situations, especially inland, *Typha* spp. can share dominance with other graminoids, particularly sedges. Cattails may invade Northern Sedge Wet Meadow stands. When this occurs, there must be >60% cover of cattails for the stand to be considered a Midwest Cattail Marsh. Up to this point, the stands usually retain more characteristics of a Northern Sedge Wet Meadow than of a Midwest Cattail Marsh.

Globally
This type may simply be a less diverse variation of *Typha* spp. - *Scirpus* spp. Mixed Herbs Midwest Herbaceous Vegetation (CEGL002229).

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Equisetum fluviatile - (Eleocharis smallii) Herbaceous Vegetation (Water Horsetail - Spikerush Marsh)

COMMON NAME	Water Horsetail - (Marsh Spikerush) Herbaceous Vegetation
SYNONYM	Water Horsetail - Spikerush Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation (V.B)
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation (V.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.B.2.N)
FORMATION	Semipermanently flooded temperate perennial forb vegetation (V.B.2.N.e)
ALLIANCE	EQUISETUM FLUVIATILE SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community is fairly uncommon in the park. It is most abundant in the larger bays like Daley and Tom Cod, though some stands may also be found in the many smaller bays throughout the park.

Globally

This association is found in Minnesota, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs in sheltered bays and shores and along slow moving streams throughout the park. Wave exposure is typically low. Standing water is typically present up to 0.5 m deep. Substrate is clay or shallow peat over clay. The water regime is permanently flooded to intermittently exposed. This community is fairly uncommon in the park. It is most abundant in the larger bays like Daley and Tom Cod, though some stands may be found in the many smaller bays as well. Stands may be ephemeral due to fluctuating water levels in the large lakes.

Globally

Stands occur in wave-washed shores, sandbars, and stream channels. Substrate is mineral soil (often sand), sometimes held together by root mats. The water regime is permanently flooded to intermittently exposed, and water depth is generally less than 1 m (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Forb	*Acorus calamus, Sagittaria rigida, Sparganium chlorocarpum*
Fern	*Equisetum fluviatile*

Globally

Stratum	Species
Fern	*Equisetum fluviatile*
Graminoid	*Eleocharis smallii*

CHARACTERISTIC SPECIES

Voyageurs National Park

Equisetum fluviatile, Acorus calamus, Sagittaria rigida, Sparganium chlorocarpum

Globally

Eleocharis smallii, Equisetum fluviatile, Sparganium fluctuans

VEGETATION DESCRIPTION

Voyageurs National Park

This herbaceous comunity is dominated by *Equisetum fluviatile, Acorus calamus, Sagittaria rigida,* and/or

Sparganium chlorocarpum. Stands may be dominated by just one of these species or they may occur mixed. Most commonly, *Equisetum fluviatile* may mix with *Acorus calamus*. *Acorus calamus* may also mix with *Sagittaria rigida* and, less commonly, *Sparganium chlorocarpum*. Other herbs that may be present but do not reach dominance include *Sium suave, Cicuta bulbifera,* and *Polygonum lapathifolium*. Aquatic species may also be present at low density and include *Potamogeton* spp., *Utricularia intermedia,* and *Najas flexilis*.

Globally
Emergent cover is greater than 25%, and floating-leaved and submergent cover is low. Emergent graminoids < 1 m dominate the stands, including *Equisetum fluviatile* and/or *Eleocharis smallii*. Associated species of low constancy include *Glyceria borealis, Isoetes echinospora, Potamogeton gramineus*, and *Utricularia vulgaris* (Harris *et al.* 1996). In northern Minnesota, stands most commonly have a mix of *Equisetum fluviatile* and *Acorus calamus*. *Acorus calamus* may also mix with *Sagittaria rigida* and, less commonly, *Sparganium chlorocarpum*. Other herbs that may be present but do not reach dominance include *Sium suave, Cicuta bulbifera,* and *Polygonum lapathifolium*. Aquatic species may also be present at low density and include *Potamogeton* spp., *Utricularia intermedia,* and *Najas flexilis* (M. Smith personal commuication 1999).

CONSERVATION RANK G4.

DATABASE CODE CEGL005258

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the herbaceous layer dominated by *Equisetum fluviatile, Acorus calamus, Sagittaria rigida,* and/or *Sparganium chlorocarpum.* Most analogous to Ontario's W5 (Harris *et al.* 1996), though more broadly defined to include W6 as well. When dominated solely by *Equisetum fluviatile*, this type can grade into the Wiregrass Sedge Shore Fen (CEGL005229).

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Zizania (aquatica, palustris) Herbaceous Vegetation [Provisional] (Wild Rice Marsh)

COMMON NAME	(Annual Wild-rice, Northern Wild-rice) Herbaceous Vegetation
SYNONYM	Wild Rice Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	ZIZANIA (AQUATICA, PALUSTRIS) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This type is typically found in sheltered and isolated bays along the shores of the large lakes in the park.

Globally

This association is found in Iowa, Indiana, Michigan, New York, Vermont, Wisconsin, Ontario, and possibly Minnesota and Manitoba.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Wild Rice Marsh is typically found in sheltered and isolated bays along the shores of large lakes. These sites are permanently flooded with water 0.5-2 meters deep. Substrate is deep muck or clay or a thin layer of muck over clay.

Globally

Stands are found in deeper, sheltered waters of slow-moving streams, protected bays, and flowage lakes, particularly at stream mouths. Water depths generally exceed 0.5 m. Substrate is rich sedimentary peat, or mucky, silty soils. A thick mat of rice stalks often covers the bottom (Harris *et al.* 1996, Voss 1972).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Floating-leaved	*Zizania palustris, Potamogeton* spp.

Globally

Stratum	Species
Floating-leaved	*Zizania palustris,Zizania aquatica*

CHARACTERISTIC SPECIES

Voyageurs National Park

Zizania palustris, Potamogeton spp.

Globally

Zizania palustris, Zizania aquatica

VEGETATION DESCRIPTION

Voyageurs National Park

Cover of *Zizania palustris* in this community is highly variable, ranging from 20-100%. Other emergent species such as *Scirpus acutus* and *Scirpus tabernaemontani* may be present at low cover. Submerged and floating aquatic plants are also often present at low cover. *Nymphaea odorata* and *Nuphar variegatum* are the most abundant floating aquatic plants. Depending on the site, any of the plant species present in the Midwest Pondweed Marsh may be present in the Wild Rice Marsh. This most commonly includes *Vallisneria americana, Sparganium*

fluctuans, Najas flexilis, Potamogeton gramineus, Potamogeton zosteriformis, and *Potamogeton friesii*.

Globally
The marsh is dominated almost entirely by the tall emergent graminoids *Zizania aquatica* or *Zizania palustris*. Floating-leaved and submerged aquatic cover can be high, but species composition is variable. Species include *Ceratophyllum demersum, Nymphaea odorata, Nuphar variegatum, Potamogeton natans, Potamogeton zosteriformis, Spirodela polyrhiza, Utricularia vulgaris,* and others (Harris *et al.* 1996).

CONSERVATION RANK G?.

DATABASE CODE CEGL002382

COMMENTS
Voyageurs National Park
Diagnostic features of the type are open water and dominance by *Zizania palustris*. This type is analogous to Ontario's W9 (Harris *et al.* 1996).

The natural and human caused fluctuation in water levels in the large lakes of Voyageurs National Park can have a significant impact on the presence of this community. Because the Wild Rice Marsh is dependent on a specific range of water levels, extreme wet or dry years may have an effect on the presence of this community in a particular area and throughout the park. For this reason, the location of this community is constantly in flux, appearing in one place where in previous years it was absent and disappearing from where it may have been the previous year.

Globally
The natural and human caused fluctuation in water levels in lakes and rivers can have a significant impact on the presence of this community. Because the Wild Rice Marsh is dependent on a specific range of water levels, extreme wet or dry years may have an effect on the presence of this community in a particular area and throughout the park. For this reason, the location of this community is constantly in flux, appearing in one place where in previous years it was absent and disappearing from where it may have been the previous year (M. Smith personal communication 1999).

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Voss, E.G. 1972. Michigan Flora, Part I. Gymnosperms and Monocots. Cranbrook Institute of Science, Bloomfield Hills Bull., No. 55.

Potamogeton spp. - Ceratophyllum spp. Midwest Herbaceous Vegetation (Midwest Pondweed Submerged Aquatic Wetland)

COMMON NAME	Pondweed species - Coontail species Midwest Herbaceous Vegetation
SYNONYM	Midwest Pondweed Submerged Aquatic Wetland
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Hydromorphic rooted vegetation (V.C)
PHYSIOGNOMIC GROUP	Temperate or subpolar hydromorphic rooted vegetation (V.C.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.C.2.N)
FORMATION	Permanently flooded temperate or subpolar hydromorphic rooted vegetation (V.C.2.N.a)
ALLIANCE	POTAMOGETON SPP. - CERATOPHYLLUM SPP. - ELODEA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type is found throughout the park area, typically in fairly sheltered bays of the large lakes, in interior lakes or, rarely, in recent beaver floodings. It can also occur in more wave exposed sites on the large lakes.

Globally

This community is found in Iowa, Illinois, Indiana, Michigan, Minnesota, Ohio, North Dakota, South Dakota, Wisconsin, and possible Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community type typically occurs in fairly sheltered bays of the large lakes, in interior lakes or, rarely, in recent beaver floodings. It can also occur in more wave exposed sites on the large lakes where water depth is not limiting. Water depth is typically 0.5-2 m. The substrate is most commonly clay, though occasionally sand or, in less exposed sites, muck over clay.

Globally

The major environmental controls on submerged aquatic vegetation, as noted by Curtis (1959), are water depth (as it relates to light intensity), water chemistry, water movement, and nature of the substrate. Various combinations of these factors can interact in a variety of ways to influence the local composition of the community. As a result, a single lake may contain a number of relatively homogeneous stands, each with a different species makeup, depending on depth, nature of adjoining shoreline, degree of protection from waves, etc. Water chemistry may be one of the few constants. Assessment of water conductivity and alkalinity are two measured parameters that can provide some understanding of the influence of water chemistry on species composition. Curtis (1959) also summarizes a study by Swindale and Curtis (1959).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Floating-leaved	*Potamogeton* spp., *Nymphaea odorata*
Submersed	*Valesneria americana, Myriophyllum sibiricum, Najas flexilis*

Globally

Stratum	Species
Submersed	*Potamogeton* spp., *Ceratophyllum* spp., *Myriophyllum* spp., *Utricularia* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Potamogeton spp., *Nymphaea odorata, Valesneria americana, Myriophyllum sibiricum, Najas flexilis*

Globally

Potamogeton spp., *Ceratophyllum* spp., *Myriophyllum* spp., *Chara* spp., *Utricularia* spp.

VEGETATION DESCRIPTION

Voyageurs National Park

The Midwest Pondweed Submerged Aquatic Wetland consists primarily of submerged aquatic plants but can contain <10% cover of floating aquatics. Percent cover of submerged aquatic vegetation is highly variable and ranges from 10-90%. Species composition and diversity are, likewise, highly variable. The most common species are: *Valesneria americana, Potamogeton richardsonii, Potamogeton epihydrus, Potamogeton zosteriformis, Potamogeton friesii, Potamogeton gramineus, Ceratophyllum demersum, Potamogeton vaseyi, Sparganium fluctuans, Myriophyllum sibiricum, Najas flexilis, Nymphaea odorata,* and *Nuphar variegatum*. Examples of this type may be relatively species rich and contain nearly all of the above listed species or be species poor and contain only two or three species. *Valesneria americana*, in particular, can occasionally be found in nearly monotypic stands. Emergent species such as *Scirpus tabernaemontani, Scirpus acutus,* and *Zizania palustris* may be present at low cover, especially in the large lakes. In the infrequent case of this community existing in a recent beaver flooding, species composition is relatively low and commonly includes *Utricularia vulgaris* and *Brasenia schreberi.*

Globally

Based on information in the northern parts of the Midwest, several vegetation subgroups can be recognized that may be separate associations. Subgroup A is a shallow (<50 cm), sparsely vegetated, open water marsh found on sand, or organic and mineral material trapped in rocky bottoms. Stands are often exposed to wave action and found in oligotrophic lakes. Dominant plants often have basal rosettes that are resistant to wave action. Typical species include *Elatine minima, Eriocaulon aquaticum, Gratiola aurea, Isoetes echinospora, Isoetes macrospora, Juncus pelocarpus*, and *Lobelia dortmanna* (Curtis 1959, Harris *et al.* 1996). Subgroup B is a shallow (<50 cm) open water marsh with emergent cover <25% and floating-leaved aquatics >25%. Substrate is a mineral soil (often sand), boulders, or a mixture of sedimentary peat and fine mineral soil. Stands can be exposed to waves or are in stream channels. Stands may often be dominated by a single species. Typical dominants include *Eleocharis acicularis, Myriophyllum* spp., *Potamogeton amplifolius, Potamogeton gramineus, Potamogeton praelongus, Potamogeton robbinsii, Sparganium fluctuans*, and *Utricularia vulgaris*. Subgroup C includes open water marsh with emergent cover < 25% and floating leaved aquatics >25%. Substrate is sedimentary peat and stands are often found in sheltered bays of lakes and streams which do not have high wave energy. Stands may often be dominated by a single species. Typical dominants include *Ceratophyllum demersum, Lemna* spp., *Myriophyllum sibiricum, Myriophyllum verticillatum, Potamogeton natans, Potamogeton pectinatus, Potamogeton richardsonii, Potamogeton zosteriformis, Ranunculus aquatilis, Utricularia vulgaris*, and *Vallisneria americana* (Curtis 1959, Harris *et al.* 1996).

CONSERVATION RANK G5Q.

DATABASE CODE CEGL002282

COMMENTS

Voyageurs National Park

Diagnostic features of the type are floating leaf aquatics <10% cover, and dominance by submerged aquatics, mainly *Vallissneria americana, Potamogeton* spp., and *Myriophyllum sibiricum*. The type is analogous to Ontario's W1 and W3 (Harris *et al.* 1996). Where floating aquatics, especially *Nymphaea odorata* and *Nuphar variegatum*, increase in cover this community grades into the Northern Water Lily Aquatic Wetland. Beaver floodings most commonly have >10% cover of floating aquatics and are therefore usually colonized by the Northern Water Lily Aquatic Wetland. The stands at Voyageurs are most like subgroup C of the global description.

The natural and human caused fluctuation in water levels in the large lake of Voyageurs National Park can have a significant impact on the structure, composition and presence of this community. See Wilcox and Meeker (1991) for a discussion on the effects of annual water level fluctuations. Extreme wet or dry years may have an effect on the presence of the Midwest Pondweed Submerged Aquatic Wetland community by changing the dominance of floating, emergent and submerged vegetation.

REFERENCES

Curtis, J. T. 1959. The vegetation of Wisconsin: An ordination of plant communities. Univ. of Wisconsin Press, Madison. 657 p.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Swindale, Delle N. and Curtis, J. T. 1957. Phytosociology of the larger submergered plants in Wisconsin lakes. Ecology 38:397-407.

Wilcox,D.A. and J.E. Meeker. 1991. Disturbance effects on aquatic vegetation in regulated and unregulated lakes in northern Minnesota. Canadian Journal of Botany. 69:1542-1551.

Nymphaea odorata - Nuphar lutea (ssp. pumila, variegata) Herbaceous Vegetation (Northern Water Lily Aquatic Wetland)

COMMON NAME	White Water Lily - Yellow Water Lily Herbaceous Vegetation
SYNONYM	Northern Water Lily Aquatic Wetland
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Hydromorphic rooted vegetation (V.C)
PHYSIOGNOMIC GROUP	Temperate or subpolar hydromorphic rooted vegetation (V.C.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.C.2.N)
FORMATION	Permanently flooded temperate or subpolar hydromorphic rooted vegetation (V.C.2.N.a)
ALLIANCE	NUPHAR LUTEA - NYMPHAEA ODORATA PERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type is found throughout the park area, typically in fairly sheltered bays of the large lakes, in interior lakes or, rarely, in recent beaver floodings.

Globally

This association is found in Michigan, Minnesota, New York, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs in sheltered bays of lakes and beaver impoundments. In confined basins, this community may also occur as an open water lag around emergent marshcommunities. Wave exposure is low. Water depth is 0.25 - 2 meters and substrate is typically muck, clay, or muck over clay. In stands that occur in beaver impoundments, standing dead trees and patches of emergent vegetation are common. The water regime is permanently flooded.

Globally

Stands occur in open, slow-moving water on lakes and streams, often less than 0.5 m deep. The substrate is variable, from muck to sedimentary peat (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Floating-leaved	*Nymphaea odorata, Nuphar lutea* ssp. *variegata, Brasenia schreberi, Potamogeton* spp.

Globally

Stratum	Species
Floating-leaved	*Nuphar lutea* ssp. *variegata, Nuphar lutea* ssp. *pumila, Nymphaea odorata, Potamogeton* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Nymphaea odorata, Nuphar lutea ssp. *variegata, Brasenia schreberi, Potamogeton* spp.

Globally

Nuphar lutea ssp. *variegata, Nuphar lutea* ssp. *pumila, Nymphaea odorata, Potamogeton* spp.

VEGETATION DESCRIPTION

Voyageurs National Park

This community is dominated by floating aquatics, mainly *Nymphaea odorata, Nuphar lutea* ssp. *variegata,* and *Brasenia schreberi*. Cover of these floating aquatics is highly variable, ranging from 10-90%. *Nymphaea odorata*

and *Nuphar lutea* ssp. *variegata* tend to dominate stands which occur in sheltered bays of lakes while *Brasenia schreberi* dominates beaver impoundments. A low amount of emergent vegetation may occur and is more common in beaver impoundments. Submerged aquatic plants often occur with the floating aquatics at 10-80% cover. The most abundant submerged aquatics in the lakes are *Potamogeton richardsonii, Potamogeton natans, Potamogeton epihydrus, Myriophyllum sibiricum, Vallisneria americana,* and *Najas flexilis*. In stands that occur in beaver impoundments, the most abundant submerged aquatic is *Utricularia vulgaris.*

Globally
Emergent vegetation cover is less than 25% and floating-leaved aquatics cover at least 25% of the surface. Typical dominants vary from stand to stand, but include *Nymphaea odorata*, *Nuphar lutea* ssp. *pumila,* and *Nuphar lutea* ssp. *variegata*. Other dominants may include *Brasenia schreberi* and *Potamogeton amplifolius*. A variety of emergent species can occur with this type (Harris *et al.* 1996).

CONSERVATION RANK G5.

DATABASE CODE CEGL002562

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the greater than 10% cover of *Nymphaea odorata, Nuphar lutea* ssp. *variegata* and/or *Brasenia schreberi*. Stands that occur in sheltered bays of the large lakes closely related to the Midwest Pondweed Submerged Aquatic Wetland (CEGL002282) but that type has less than 10% cover of floating aquatics. Many stands that are intermediate between these two types exist. When found in beaver impoundments, the Northern Water Lily Aquatic Wetland many occur with patches of Northern Sedge Wet Meadow (CEGL002257) or Leatherleaf-Sweet Gale Shore Fen (CEGL005228), which together may be mapped as Deep Marsh Complex (DMX). Ths type is analogous to Ontario's W4 (Harris *et al.* 1996).

This community is subject to disturbance by beaver activity.

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

6.5 Northern Conifer and Hardwood Swamps

Fraxinus nigra - Mixed Hardwoods-Conifers / Cornus sericea / Carex spp. Forest (Black Ash - Mixed Hardwood Swamp)

COMMON NAME	Black Ash - Mixed Hardwoods - Conifers / Red-osier Dogwood / Sedge species Forest
SYNONYM	Black Ash - Mixed Hardwood Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Saturated cold-deciduous forest (I.B.2.N.g)
ALLIANCE	FRAXINUS NIGRA - ACER RUBRUM SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This community type occurs throughout the park in shallow depressions and low areas or adjacent to peatlands.

Globally

This black ash - hardwood swamp forest type is found widely in the northern Midwest region of the United States and into the boreal region of Central Canada. This association is found in Illinois, Michigan, Minnesota, western North Dakota, Wisconsin, Manitoba, and Ontario. It may be in Indiana, too.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Black Ash-Mixed Hardwood Swamp occurs throughout the park in shallow depressions and low areas or adjacent to peatlands. In some cases, soils may be fairly deep peats reaching depths of >30 cm. More commonly, however, the soils of this type consist of 4-10 cm mineral soils (often with high organic matter content) or peat over dense clay. Under wetter conditions, the soils are typically peats, with hummock and hollow microtopography well developed. In these situations, standing water is usually present throughout the season in the hollows. Under relatively drier conditions (though still poorly drained), the soils are mineral soils and there is minimal microtopographic relief. Standing water is usually absent in these circumstances. Depending on topographic position and substrate, the water regime in these communities can be temporarily to seasonally flooded or saturated.

Globally

Stands occur on poorly drained wetland depressions on flat, gentle, or moderate slopes in valleys with impeded drainages or near lake shores. These wet pockets contain fine sandy clay loams, fine loams, mucks or soils with well-decomposed peat. Hydrology can vary from seasonally flooded to saturated. Conditions are often transitional to uplands (Sims *et al.* 1989, Minnesota NHP 1993, Cleland *et al.* 1994, Chambers *et al.* 1997).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Fraxinus nigra*
Tree sub-canopy	*Fraxinus nigra*
Tall shrub	*Alnus incana, Fraxinus nigra*
Short shrub	*Rubus pubescens*
Fern	*Equisetum sylvaticum, Dryopteris carthusiana, Athyrium angustum*
Graminoid	*Calamagrostis canadensis, Carex* spp.
Nonvascular	*Rhytidiadelphus triquetrus, Calliergon cordifolium, Mniaceae, Drepanocladus* spp.

Globally

Stratum	Species

Tree canopy	*Fraxinus nigra, Abies balsamea, Acer rubrum*
Tall shrub	*Alnus incana*

CHARACTERISTIC SPECIES
Voyageurs National Park
Fraxinus nigra, Alnus incana

Globally
Fraxinus nigra, Alnus incana

VEGETATION DESCRIPTION
Voyageurs National Park
The canopy and sub canopy (if present) of the Black Ash-Mixed Hardwood Swamp most commonly consists solely of *Fraxinus nigra*. In some situations, *Thuja occidentalis* may be mixed in these strata at low cover (< 25%). Canopy cover is typically 70-90% but may be as low as 40%. Canopy height is generally 10-20 meters. The subcanopy is either absent or present at low (20-30%) cover. In most stands, *Fraxinus nigra* saplings are present in the shrub strata around 20%. In wetter stands, *Alnus incana* shrubs may be present, typically around 20-30% cover. *Abies balsamea* and *Acer spicatum* can also occasionally be found in the shrub layers. The herbaceous layer is very diverse and usually reaches 80-100% cover. The most abundant species are *Calamagrostis canadensis, Equisetum sylvaticum, Rubus pubescens, Dryopteris carthusiana,* and *Athyrium angustum*. In addition to these, the following species are also common: *Iris versicolor, Carex lacustris, Carex intumescens, Carex gracillima, Platanthera psycodes, Mitella nuda,* and *Aster macrophyllus*. The nonvascular component of this community tends to be more prevalent in the wetter stands and consists of *Rhytidiadelphus triquetrus, Calliergon cordifolium, Mniaceae,* and *Drepanocladus* spp. In these wetter stands, bryophytes typically colonize the hollows, low hummocks and fallen logs at 20-40% cover.

Globally
Canopy structure is variable, ranging from 30 to 90% cover. The canopy is dominated by *Fraxinus nigra* (at least 50% cover), with a diverse mix of hardwoods and conifers in the main and sub canopies, including *Abies balsamea, Acer rubrum, Acer saccharum, Betula papyrifera, Betula alleghaniensis, Fraxinus pennsylvanica, Picea glauca, Populus balsamifera, Populus tremuloides, Thuja occidentalis, Tilia americana*, and *Ulmus americana*. Shrub and sapling species include *Abies balsamea, Acer spicatum, Alnus incana, Cornus sericea, Corylus cornuta, Lonicera canadensis, Prunus virginiana, Ribes triste, Rubus idaeus*, and *Rubus pubescens*. Herbaceous species include *Aralia nudicaulis, Aster macrophyllus, Athyrium felix-femina, Carex gracillima, Carex intumescens, Cinna latifolia, Circaea alpina, Clintonia borealis, Dryopteris carthusiana, Equisetum sylvaticum, Fragaria virginiana, Maianthemum canadense, Mitella nuda, Streptopus roseus, Thalictrum pubescens*, and *Trientalis borealis*. Mosses include *Climacium dendroides* and *Plagiomnium* spp. (Sims *et al.* 1989, Minnesota DNR 1993, Cleland *et al.* 1994, Harris *et al.* 1996, Chambers *et al.* 1997). A floodplain variant may also occur, with more hardwood dominance, with wetter species present, such as *Alnus incana, Calamagrostis canadensis*, and *Caltha palustris* (Harris *et al.* 1996). Diagnostic features include the dominance by *Fraxinus nigra*.

CONSERVATION RANK G4.

DATABASE CODE CEGL002105

COMMENTS
Voyageurs National Park
Diagnostic features of the type are canopy of *Fraxinus nigra*. Analogous to Ontario's W33 and W34 (Harris *et al.* 1996). As cedar becomes more common in the canopy and subcanopy, this type grades into the White Cedar-Black Ash Swamp. The Black Ash-Mixed Hardwood Swamp differs from the White Cedar-Black Ash Swamp in that it contains less than 25% cover of cedar in the canopy or subcanopy. Stands intermediate between these two types are common.

Many Black Ash-Mixed Hardwood Swamps occur in drainages and are therefore occasionally influenced by beaver activity. Since Black ash trees cannot survive prolonged periods of inundation, these communities are frequently flooded out by beaver activity.

REFERENCES

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Cleland, D. T., J. B. Hart, G. E. Host, K. S. Pregitzer, and C. W. Ramm. 1994. Field guide to the ecological classification and inventory system of the Huron-Manistee National Forest. USDA Forest Service, North Central Forest Experiment Station.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Thuja occidentalis - Fraxinus nigra Forest (White Cedar - Black Ash Swamp)

COMMON NAME	Northern White-cedar - Black Ash Forest
SYNONYM	White Cedar - Black Ash Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Saturated mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.d)
ALLIANCE	THUJA OCCIDENTALIS - ACER RUBRUM SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is found in pockets throughout the park, but also occurs as large stands in the environs west of park, and in the Rat Root peatlands.

Globally

This association is found in northern Minnesota, Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type is found in confined basins surrounded by upland or as part of large wetland complexes. If associated with peatlands, it is usually found on the upland border where wetter, more minerotrophic conditions exist. Soils are either deep, well decomposed peats or shallow, well decomposed peats over clay. Microtopography of hummocks and hollows may be well developed or absent. Standing water is often present. The water regime is seasonally flooded to saturated.

Globally

This type is found in confined basins surrounded by upland or as part of large wetland complexes. If associated with peatlands, it is usually found on the upland border where wetter, more minerotrophic conditions exist. Soils are either deep, well decomposed peats or shallow, well decomposed peats over clay. Microtopography of hummocks and hollows may be well developed or absent. Standing water is often present. The water regime is seasonally flooded to saturated (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Thuja occidentalis, Fraxinus nigra*
Tree sub-canopy	*Thuja occidentalis*
Tall shrub	*Acer spicatum, Alnus incana, Abies balsamea*
Short shrub	*Rubus pubescens*
Forb	*Coptis groenlandica*
Fern	*Equisetum sylvaticum*
Graminoid	*Carex intumescens, Carex* spp., *Calamagrostis canadensis*
Nonvascular	*Rhytidiadelphus triquetrus, Calliergon* spp., *Mniaceae*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis, Fraxinus nigra*
Tall shrub	*Alnus incana*

CHARACTERISTIC SPECIES

Voyageurs National Park

Thuja occidentalis, Fraxinus nigra, Alnus incana

Globally
Thuja occidentalis, Fraxinus nigra, Alnus incana

VEGETATION DESCRIPTION
Voyageurs National Park
The White Cedar-Black Ash Swamp consists of a mixed canopy of *Fraxinus nigra* and *Thuja occidentalis* each comprising at least 25% relative cover. It is also found with a canopy solely of *Fraxinus nigra* (usually 80-100% cover) and a sub-canopy of *Thuja occidentalis* (40- 90% cover). The shrub layer, with 20-40% cover, is dominated by *Acer spicatum, Alnus incana, Abies balsamea, Fraxinus nigra, Rubus pubescens*, with some *Acer rubrum*. *Alnus incana* alone may occasionally occupy the shrub layer at 70-90% cover. The herbaceous layer usually covers 80-100% of the forest floor and is very diverse. The most common herbs are *Equisetum sylvaticum, Carex intumescens, Carex gracillima, Calamagrostis canadensis,* and *Coptis groenlandica*. Moss cover is highly variable ranging from 30-90%. *Rhytidiadelphus triquetrus, Calliergon cordifolium, Calliergon giganteum, Mniaceae, Thuidium* spp., *Sphagnum warnstorfii,* and *Sphagnum squarrosum* are the most abundant mosses.

Globally
Canopy cover is variable, sometimes fairly open. *Thuja occidentalis* and *Fraxinus nigra* dominate the canopy, but some stands may have *Fraxinus nigra* in the upper canopy and *Thuja occidentalis* in the lower canopy. *Thuja occidentalis* also tends to occur on the hummocks and *Fraxinus nigra* in the hollows. *Populus tremuloides* can be a major component, but this may be caused by logging of *Thuja occidentalis*. *Acer rubrum, Betula alleghaniensis*, and *Picea glauca* may also be present. Shrubs include *Acer spicatum, Alnus incana, Cornus alternifolia, Lonicera canadensis, Ribes* spp., and *Rubus pubescens*. The herb rich layer includes *Aralia nudicaulis, Arisaema triphyllum, Carex gracillima, Carex intumescens, Clintonia borealis, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Tiarella cordifolia* and *Trientalis borealis* (Chambers *et al.* 1997). In northern Minnesota, moss cover is highly variable, ranging from 30-90%. The most abundant mosses are *Rhytidiadelphus triquetrus, Calliergon cordifolium, Calliergon giganteum, Mniaceae, Thuidium* spp., *Sphagnum warnstorfii*, and *Sphagnum squarrosum* (M. Smith personal communication 1999).

CONSERVATION RANK G?

DATABASE CODE CEGL005165

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy of *Thuja occidentalis* and *Fraxinus nigra*, both comprising at least 25% cover. Stands may also have a canopy of *Fraxinus nigra* with at least 25% cover of *Thuja occidentalis* in the subcanopy. This type can be similar to the White Cedar-Boreal Conifer Forest (CEGL002449), though it is usually wetter and more minerotrophic. It is perhaps intermediate between that type and the Black Ash-Mixed Hardwood Swamp (CEGL002105) in terms of moisture and mineral status. When the cover of *Fraxinus nigra* in the canopy is less than 25%, the stand becomes a White Cedar-Boreal Conifer Forest.

This type, like the Black Ash-Mixed Hardwood Swamp, is occasionally subject to beaver floodings.

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Picea mariana / Alnus incana / Sphagnum spp. Forest (Black Spruce / Alder Rich Swamp)

COMMON NAME	Black Spruce / Speckled Alder / Peatmoss species Forest
SYNONYM	Black Spruce / Alder Rich Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	PICEA MARIANA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is most common in the northern parts of the park, where peatlands are more extensive, but can be found throughout the park in small confined basins.

Globally

This community is found in northern Minnesota, northern Michigan, northwestern Ontario, and southeastern Manitoba.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs as part of large peatlands, in confined basins and along the upland margins of less minerotrophic peatlands. The substrate is deep, fibric Sphagnum peat or peat over clay. Hummock and hollow microtopography is moderately to well developed with standing water occasionally occurring in the hollows. The water regime is saturated.

Globally

This type occurs as part of large peatlands, in confined basins and along the upland margins of less minerotrophic peatlands (M. Smith personal communication 1999). Stands occur on level, wet, poorly drained organic soils (Zoladeski 1995). The substrate is deep, fibric Sphagnum peat or shallow peat over clay. Hummock and hollow microtopography is moderately to well developed with standing water occasionally occurring in the hollows. The water regime is saturated.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Picea mariana*
Tall shrub	*Alnus incana*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Calamagrostis canadensis, Carex lacustris*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Tree canopy	*Picea mariana, Picea glauca*
Tall shrub	*Alnus incana*
Graminoid	*Carex rostrata, Calamagrostis canadensis*
Nonvascular	*Sphagnum* spp., *Calliergon* sp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Picea mariana, Alnus incana

Globally
Picea mariana, Alnus incana

VEGETATION DESCRIPTION

Voyageurs National Park
The canopy of *Picea mariana* in this community is typically uneven aged and fairly open, ranging from 20-40%. In rare cases, canopy coverage may be as high as 90%. *Larix laricina* and *Thuja occidentalis* can also be found in the canopy at low cover. A shrub layer of *Alnus incana* and *Picea mariana* ranges from 30-90% but is most commonly found in the upper part of that range. The dwarf-shrub strata is dominated by *Ledum groenlandicum* and, to a lesser extent, *Chamaedaphne calyculata*. Coverage of dwarf-shrubs is highly variable (10-80%). The herbaceous layer is typically moderately rich and dominated by *Calamagrostis canadensis, Maianthemum trifolium,* and/or *Carex lacustris. Carex trisperma, Osmunda cinnamomea, Equisetum sylvaticum, Cornus canadensis*, and *Dryopteris carthusiana* are also common. The cover of herbaceous species is highly variable, ranging from 20-90%. Sphagnum moss typically occupies 90-100% of the forest floor. The most abundant species are *Sphagnum magellanicum, Sphagnum girgensohnii, Sphagnum centrale, Sphagnum wulfianum,* and *Sphagnum recurvum sensu lato*.

Globally
The overstory is composed almost exclusively of conifers. *Picea mariana* is the most abundant tree and may occur in pure stands. *Abies balsamea, Larix laricina*, and *Thuja occidentalis* vary from minor to codominant. There is a moderately well developed tall shrub/sapling layer, consisting of *Alnus incana* and saplings of the canopy trees. Several shrubs, many of them ericaceous, make up a low shrub layer. These include *Andromeda polifolia, Chamaedaphne calyculata, Gaultheria hispidula, Ledum groenlandicum, Linnaea borealis, Rubus pubescens*, and *Vaccinium angustifolium*. The herbaceous layer is frequently species rich, containing species such as *Calamagrostis canadensis*, *Carex leptalea*, *Carex trisperma, Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris cristata, Eriophorum* spp., *Mitella nuda*, and *Trientalis borealis*. Mosses include *Dicranum flagellare, Dicranum polysetum, Pleurozium schreberi, Ptilium crista-castrensis, Sphagnum girgensohnii, Sphagnum magellanicum*, and *Sphagnum nemoreum* (Sims *et al.* 1989, Harris *et al.* 1996, Chambers *et al.* 1997).

CONSERVATION RANK G5.

DATABASE CODE CEGL002452

COMMENTS

Voyageurs National Park
Diagnostic features of the type include the canopy of *Picea mariana* with less than 25% cover of other conifers and a shrub layer of *Alnus incana*. Analogous to Ontario's W29 and W30 (Harris *et al.* 1996). The Black Spruce-Tamarack Poor Swamp is very similar to the Black Spruce/Alder Rich Swamp but contains greater than 25% relative cover of Larix laricina. In cases where spruce cover is low, this type can grade into the Speckled Alder Swamp.

REFERENCES

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Janssen, C. R. 1967. A floristic study of forests and bog vegetation, northwestern Minnesota. Ecology 48(5):751-765.

Kurmis, V., S. L. Webb, and L. C. Merriam. 1986. Plant communities of Voyageurs National Park, Minnesota, U.S.A. Can. J. Bot. 64:531-540.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

Larix laricina / Alnus incana Forest (Northern Tamarack Rich Swamp)

COMMON NAME	Tamarack / Speckled Alder Forest
SYNONYM	Northern Tamarack Rich Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Saturated cold-deciduous forest (I.B.2.N.g)
ALLIANCE	LARIX LARICINA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type occurs as part of large peatlands, in confined basins and along the upland margins of less minerotrophic peatlands throughout the park.

Globally

This community is found in the United States in northern and central parts of Minnesota, Wisconsin, and Michigan; and in Canada in Ontario, Manitoba, and probably elsewhere.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs as part of large peatlands, in confined basins and along the upland margins of less minerotrophic peatlands. The substrate is deep, fibric Sphagnum peat or shallow peat over clay. Hummock and hollow microtopography is moderately to well developed, with standing water occasionally occurring in the hollows. The water regime is saturated.

Globally

Stands are found on the shores of lakes and rivers above the flooding level, as well as margins of flowage areas of peatland complexes. The substrate is primarily a well-decomposed woody peat in wet, saturated soils, but can also be a moist mineral soil. Hummock and hollow microtopography is moderately to well developed, with standing water occasionally occurring in the hollows. (Sims *et al.* 1989, MN NHP 1993, Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Larix laricina*
Tall shrub	*Alnus incana*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata*
Forb	*Maianthemum trifolium, Sarracenea purpurea*
Graminoid	*Calamagrostis canadensis, Carex lacustris*
Nonvascular	*Sphagnum* spp.(*Sphagnum magellanicum, Sphagnum recurvum sensu lato, Sphagnum russowii*)

Globally

Stratum	Species
Tree canopy	*Larix laricina*
Tall shrub	*Alnus incana, Betula pumila, Thuja occidentalis*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata, Gaultheria hispidula*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Larix laricina, Alnus incana, Chamaedaphne calyculata, Betula pumila, Sphagnum spp.

Globally
Larix laricina,Chamaedaphne calyculata, Betula pumila, Sphagnum spp.

VEGETATION DESCRIPTION
Voyageurs National Park
The canopy of *Larix laricina* in this community is typically uneven-aged and fairly open, ranging from 20-50%. *Thuja occidentalis* and *Picea mariana* may also occur in the canopy at low densities (<25% relative cover). A shrub layer of *Alnus incana* is typically present at 40-90% cover. The shrub layer may also include *Betula pumila* and *Salix* spp. (typically *Salix pyrifolia, Salix discolor,* and/or *Salix pedicellaris*). A dwarf-shrub layer of *Ledum groenlandicum* and *Chamaedaphne calyculata* is typically present at 70-90% cover, though it may be as low as 10% cover in some stands. The herbaceous layer is moderately species rich and highly variable in cover, ranging from very low to continuous. The most abundant species are *Calamagrostis canadensis, Maianthemum trifolium*, and *Carex lacustris*. *Equisetum sylvaticum, Rubus pubescens, Carex trisperma,* and *Potentilla palustris* are also commonly present. Sphagnum moss typically occupies 90-100% of the forest floor. The most abundant species are *Sphagnum magellanicum, Sphagnum recurvum sensu lato,* and *Sphagnum russowii. Calliergon cordifolium* and/or *Calliergon giganteum* infrequently colonize the wet hollows.

Globally
The canopy layer varies from closed (60-100% cover) to open (25-60% cover), and may also range from 3-10 m in height. *Larix laricina* is the dominant tree species, with associates of *Picea mariana* and *Thuja occidentalis.* The shrub, herb, and moss layers can be very rich. The shrub layer typically contains *Alnus incana,* along with *Abies balsamea, Cornus sericea, Salix* spp., and *Picea mariana*. The dwarf-shrub layer is strongly ericaceous, including *Ledum groenlandicum* and *Gaultheria hispidula*. Other dwarf-shrubs include *Chamaedaphne calyculata, Linnaea borealis, Lonicera villosa, Ribes triste, Rosa acicularis*, and *Rubus pubescens*. Herbaceous cover is variable; species include *Carex disperma, Carex lacustris, Carex trisperma, Coptis trifolia, Cornus canadensis, Equisetum sylvaticum, Galium triflorum, Maianthemum canadense, Maianthemum trifolium, Mitella nuda, Trientalis borealis*, and *Viola renifolia*. The moss layer, which is sometimes patchy, includes *Dicranum polysetum, Hylocomnium spendens, Pleurozium schreberi, Ptilium crista-castrensis, Rhytidiadelphus triquestrus, Sphagnum capillifolium, Spaghnum girgensohnii*, and *Sphagnum nemoreum*. (Sims *et al.* 1989, Minnesota NHP 1993, Harris *et al.* 1996).

CONSERVATION RANK G4.

DATABASE CODE CEGL002471

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy consisting solely of *Larix laricina*, with *Alnus incana* in the shrub layer. This type, Northern Tamarack Rich Swamp, is usually wetter than the Black Spruce/Alder Rich Swamp (CEGL002452) or the Black Spruce/Labrador Tea Poor Swamp (CEGL002454), but the *Sphagnum* spp. layer can range from patchy to more continuous. The type differs from those communities by having a canopy consisting solely of *Larix laricina. Picea mariana* and/or *Thuja occidentalis* may be present in the canopy at less than 25% relative cover. The type is also very similar to the Speckled Alder Swamp (CEGL002381) but has a canopy of *Larix laricina* with at least 20% cover over the alder shrub layer. This type is somewhat analogous to Ontario's W31 (Harris *et al.* 1996).

Globally
Fires may move through this community in dry years.

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Thuja occidentalis - (Picea mariana - Abies balsamea) / Alnus incana Forest [White Cedar - (Mixed Conifer) / Alder Swamp]

COMMON NAME	Northern White-cedar - (Black Spruce, Balsam Fir) / Speckled Alder Forest
SYNONYM	White Cedar - (Mixed Conifer) / Alder Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	THUJA OCCIDENTALIS SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type occurs in localized areas throughout the park.

Globally

This community is found in northern Minnesota, northern Wisconsin, Upper and Lower Michigan, southeastern Manitoba, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs in moderately minerotrophic conditions over deep peat. Hummock and hollow microtopography is usually well developed. In wetter stands, there is often standing water present in the hollows. Coarse woody debris can be significant. The water regime is saturated.

Globally

This community is found on level to gently sloping ground with wet, organic (Sims *et al.* 1989) or mineral soil (MN NHP 1993). Stands typically occur along the margins of peatlands, in drainage courses, or shallow depressions. The substrate has moderately minerotrophic conditions over deep peat. Hummock and hollow microtopography is usually well developed. In wetter stands, there is often standing water present in the hollows. Coarse woody debris can be significant. The water regime is saturated.

Schwintzer and Tomberlin (1982) reported detailed results on the chemical characteristics of the ground water of several wetland types in Lower Michigan. They found that it was difficult to differentiate swamps dominated by conifers from those dominated by other vegetation on the basis of ground water. The swamps were moderately to strongly minerotrophic and had circumneutral pH.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Emergent tree	*Picea mariana*
Tree canopy	*Thuja occidentalis, Larix laricina*
Tall shrub	*Alnus incana, Abies balsamea, Betula pumila*
Short shrub	*Ledum groenlandicum, Rubus pubescens*
Forb	*Cornus canadensis, Mitella nuda, Maianthemum trifolium*
Graminoid	*Carex* spp., *Calamagrostis canadensis*
Nonvascular	*Sphagnum* spp., *Calliergon* spp., *Rhytidiadelphus triquetrus, Drepanocladus* spp.

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tall shrub	*Alnus incana*

Forb	*Coptis trifolia, Maianthemum canadense*
Graminoid	*Calamagrostis canadensis, Carex disperma, Carex leptalea*
Nonvascular	*Hylocomium splendens, Rhytidiadelphus triquestrus, Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Thuja occidentalis, Alnus incana, Sphagnum spp.

Globally

Thuja occidentalis, Alnus incana, Coptis trifolia, Carex disperma, Hylocomium splendens, Sphagnum spp.

VEGETATION DESCRIPTION

Voyageurs National Park

Thuja occidentalis typically forms a fairly closed canopy in this community with covers ranging from 70-100%. In larger peatlands, however, the canopy may be as low a 30%. It is in these larger peatlands that an emergent layer of *Picea mariana* becomes common with low (10-20%) cover. A shrub layer of *Alnus incana* and/or *Abies balsamea* is nearly always present but cover is highly variable, ranging from 20-90%. Other species common in the shrub layer include *Thuja occidentalis, Betula pumila,* and *Fraxinus nigra*. A dwarf-shrub strata, if present, exists at low (10-25%) cover but can be quite species diverse. Most abundant species include *Ledum groenlandicum, Cornus rugosa, Fraxinus nigra, Lonicera oblongifolia*, and *Ribes* spp. Cover in the herbaceous strata is highly variable and ranges from 30-90%. Species diversity in the herbaceous strata is very high. The most abundant species are *Rubus pubescens, Carex trisperma, Carex disperma, Carex leptalea, Calamagrostis canadensis, Cornus canadensis, Mitella nuda, Equisetum sylvaticum, Iris versicolor,* and *Gymnocarpium dryopteris*. Like the herbaceous layer, the nonvascular strata can be very diverse. In some circumstances, *Sphagnum* spp. dominate the nonvascular strata with 90-100% cover, leaving other species like *Rhytidiadelphus triquetrus* and *Calliergon cordifolium* to colonize the wet hollows. In other cases, though, *Sphagnum* spp. is found sharing dominance with a mix of *Rhytidiadelphus triquetrus, Calliergon cordifolium, Calliergon giganteum, Rhizomnium magnifolium, Rhizomnium pseudopunctatum* and *Climacium dendroides*. In both cases, the dominant Sphagnum species found in this community are *Sphagnum warnstorfii, Sphagnum wulfianum, Sphagnum centrale*, and *Sphagnum recurvum sensu lato.*

The White Cedar Tamarack Peat Swamp phase is a mixed evergreen-deciduous forest domined by conifers, especially *Thuja occidentalis* and *Larix laricina.* In some cases, *Larix laricina,* along with lesser amounts of *Picea mariana,* may form an emergent layer over a canopy of *Thuja occidentalis*. Canopy coverage is typically 30-60% and is commonly composed of uneven aged trees. Though typically 10-15 m tall, in some cases trees may be 5-10 m tall. A shrub/scrub layer of *Alnus incana, Betula pumila,* and/or *Thuja occidentalis* is usually present at 40-70% cover. A dwarf-shrub layer of *Rubus pubescens*, *Cornus canadensis*, *Ledum groenlandicum* and/or *Chamaedaphne calyculata* is typically present at low cover. The herbaceous strata is fairly diverse and exists at a wide range of densities. The most abundant species are*, Carex leptalea* and *Maianthemum trifolium*. Sphagnum moss normally forms a continuous carpet on the forest floor. This strata is dominated by *Sphagnum warnstorfii, Sphagnum capillifolium, Sphagnum magellanicum, and Sphagnum russowii*. Wet hollows may be colonized by *Calliergon cordifolium, Calliergon giganteum*, *Mniaceae,* and/or *Drepanocladus* spp.

Globally

The canopy is often moderately dense to dense (MN NHP 1993). Basal areas of 42.2-62.2 m2/ha and densities of 2457-7565 stems/ha have been reported in four stands in Lower Michigan, using a tree definition of woody stems greater than 2.5 cm dbh (Schwintzer 1981). The understory structure consists of high hummocks and deep, water-filled hollows, with fallen, moss-covered logs common. *Thuja occidentalis* is usually moderately to strongly dominant in the canopy, but occasionally *Picea mariana* may overtop the subdominant *Thuja occidentalis*. Other species include *Abies balsamea, Acer rubrum, Betula papyrifera, Fraxinus nigra, Larix laricina* and, more rarely*, Picea glauca* (in northern Minnesota and northwestern Ontario), or *Tsuga canadensis* (eastward). The shrub layer in this community is sparse to dense, in inverse proportion to the tree canopy. Species present in this stratum include *Alnus incana, Chamaedaphne calyculata, Cornus sericea, Gaultheria hispidula, Ledum groenlandicum, Linnaea borealis, Rosa acicularis, Rubus pubescens*, and *Vaccinium myrtilloides*. *Nemopanthus mucronatum* and *Viburnum cassinoides* are more common eastward. Species diversity in the herbaceous layer can be very high. The most common species are *Carex* spp. (including *Carex disperma, Carex leptalea*), *Coptis trifolia, Cornus canadensis, Clintonia borealis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Mitella nuda, Trientalis borealis*, and *Viola renifolia*. Mosses include *Hylocomium splendens, Pleurozium schreberi, Ptilium crista-*

castrensis, Rhytidiadelphus triquetrus, *Sphagnum capillifolium, Sphagnum girgensohnii*, and *Sphagnum magellanicum*. Moss cover may be thin where the canopy is very dense. Diagnostic species include *Thuja occidentalis* as a dominant/co-dominant species, with a combination of acidic and minerotrophic understory species, such as *Alnus incana* and *Cornus sericea* (Sims *et al.* 1989, Harris *et al.* 1996, Chambers *et al.* 1997).

CONSERVATION RANK G4.

DATABASE CODE CEGL002456

COMMENTS

Voyageurs National Park

Diagnostic features of the type are canopy of *Thuja occidentalis* with *Alnus incana* shrubs and *Sphagnum* spp moss. This type is somewhat analogous to Ontario's W31 (Harris *et al.* 1996). In wetter and more minerotrophic conditions, the cedar in the canopy is often mixed with black ash and can grade into the White Cedar-Black Ash Swamp. The White Cedar-Black Ash Swamp, however, must have at least 25% of both cedar and ash in the canopy or a canopy of black ash with a subcanopy of cedar. The White Cedar-Black Ash Swamp also tends to have much less *Sphagnum* spp. than does the White Cedar-Mixed Conifer/Alder Swamp.

In the cases where *Larix laricina* is present in the canopy or in the emergent layer, the White Cedar-Mixed Conifer/Alder Swamp can grade into the White Cedar-Tamarack Peat Swamp. Tamarack must be present with at least 25% of the relative cover for a stand to be considered a White Cedar-Tamarack Peat Swamp.

In the cases where *Larix laricina* (Tamarack) is present in the canopy or in the emergent layer, the White Cedar-Mixed Conifer/Alder Swamp (WCS) can grade into a phase described as the White Cedar-Tamarack Peat Swamp (WCT). At Voyageurs, this phase was not recognized as a separate association because the phase is very similar to stands without Tamarack as a dominant So both WCS and WCT are placed into the one association. (CEGL002456). Tamarack must be present with at least 25% of the relative cover for a stand to be considered part of the White Cedar-Tamarack Peat Swamp phase. Globally this phase is recognized as a distinct type (CEGL005225), based on patterns outside of Voyageurs.

This is one of the most floristically diverse types in the park. The richer stands of this type often contain many orchids including the state flower, *Cypripedium reginae*.

Globally

See Harris *et al.* (1996) type W31 for further descriptions of Ontario examples of this type. Tipup mounds caused by blowdowns are common, in part because the very wet soils permit only shallow rooting by *Thuja occidentalis*.

REFERENCES

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Clausen, J. J. 1957. A phytosociological ordination of the conifer swamps of Wisconsin. Ecology. 38(4):638-645.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Schwintzer, C. R. 1981. Vegetation and nutrient status of northern Michigan bogs and conifer swamps with a comparison to fens. Can. Journ. Botany 59:842-853.

Schwintzer, C. R. and T. J. Tomberlin. 1982. Chemical and physical characteristics of shallow ground waters in northern Michigan bogs, swamps, and fens. Amer. J. Bot. 69:1231-1239.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea mariana / Ledum groenlandicum / Sphagnum spp. Forest (Black Spruce / Labrador Tea Poor Swamp)

COMMON NAME	Black Spruce / Labrador-tea / Peatmoss species Forest
SYNONYM	***Black Spruce / Labrador Tea Poor Swamp***
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	PICEA MARIANA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is most common in the northern parts of the park, where peatlands are more extensive, but can be found throughout the park.

Globally

This community is found in northern Michigan, northwestern Ontario, northern Minnesota, northern Wisconsin, and southeastern Manitoba. This community is rare in Michigan.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type is found in confined peatland basins, on the upland margins of large peatlands, in poorly drained depressions in bedrock, and removed from the water's edge on peatland shorelines. The substrate is deep, acidic Sphagnum peat that is mineral poor. Hummock and hollow microtopography is moderately to well developed. The water regime is saturated.

Globally

This type is found in confined peatland basins, on the upland margins of large peatlands, in poorly drained depressions in bedrock, and removed from the water's edge on peatland shorelines. Stands occur on level, wet sites with organic soils (Zoladeski *et al.* 1995). The substrate is deep, acidic Sphagnum peat that is mineral poor (M. Smith personal communication). Hummock and hollow microtopography is moderately to well developed. Water regime is saturated.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Picea mariana, Larix laricina*
Tall shrub	*Picea mariana, Alnus incana, Betula pumila*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata*
Forb	*Maianthemum trifolium*
Graminoid	*Carex trisperma*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Tree canopy	*Picea mariana*
Short shrub	*Ledum groenlandicum*
Graminoid	*Carex trisperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Picea mariana, Larix laricina, Alnus incana, Ledum groenlandicum, Carex trisperma, Sphagnum spp.

Globally
Picea mariana, Ledum groenlandicum, Carex trisperma, Sphagnum spp.

VEGETATION DESCRIPTION

Voyageurs National Park
This community includes both woodland and forested examples, so canopy cover is widely variable. *Picea mariana* trees dominate this type and are typically 10-20 m tall in the forested stands and 5-10 m tall in the woodland stands. Scattered *Larix laricina* trees are occasionally present, and it may occur as a co-dominant (25-75% cover) in some stands. The canopy, especially in the woodland phase, tends to be uneven aged. Shrub strata are usually absent, though *Picea mariana* saplings may be present at low cover, as can *Alnus incana* or *Betula pumila*. The dwarf-shrubs *Ledum groenlandicum* and *Chamaedaphne calyculata* are nearly always present, but cover is highly variable, ranging from 20-90%. Cover of dwarf-shrubs tends to be higher in the more open stands. Other ericaceous shrubs such as *Kalmia polifolia, Andromeda polifolia,* and *Vaccinium oxycoccos* can also be present at low cover. The herbaceous strata is species poor and present at low density, usually less than 40% cover. The most widespread species are *Carex trisperma* and *Maianthemum trifolium*. Scattered minerotrophic species may also be present, most commonly *Carex lacustris, Iris versicolor* and *Monotropa uniflora*. Sphagnum moss typically covers nearly 100% of the forest floor. The most abundant species are *Sphagnum magellanicum, Sphagnum recurvum sensu lato, Sphagnum capillifolium,* and *Sphagnum russowii.* In the more mixed *Picea mariana-Larix laricina* stands, nutrient levels may be higher. The herbaceous layer is moderately species rich and usually comprises 10-40% cover. *Maianthemum trifolium* and *Carex trisperma* are the most widespread herbaceous species. Other common species include *Menyanthes trifolia, Carex paupercula, Calamagrostis canadensis, Carex leptalea, Rubus pubescens,* and *Potentilla palustris*. Sphagnum moss typically occupies 90-100% of the forest floor. The most abundant species are *Sphagnum magellanicum, Sphagnum recurvum sensu lato, Sphagnum warnstorfii*, and *Sphagnum fuscum. Calliergon cordifolium* and/or *Calliergon giganteum* may colonize the wet hollows.

Globally
The overstory of this community is made up of conifers. The tree canopy is broken to closed over a moderately well developed low shrub layer, sparse herbaceous layer, and a carpet of mosses (Kurmis *et al.* 1986). The canopy is often pure *Picea mariana*, but *Larix laricina* may be a codominat. *Abies balsamea* can be present to codominant, and the occasional *Pinus banksiana* may occur (Sims *et al.* 1989). The shrubs are primarily ericaceous and include *Chamaedaphne calyculata*, *Gaultheria hispidula*, *Kalmia polifolia*, *Ledum groenlandicum*, and *Vaccinium* spp, but mixed spruce-tamarack stands can contain *Alnus incana* or *Betula pumila*. The few herbaceous species found in this community include *Carex lasiocarpa, Carex trisperma*, *Clintonia borealis*, *Coptis trifolia*, *Cornus canadensis*, and *Maianthemum trifolium*. Occasional minerotrophic indicators found in northern Minnesota include *Carex lacustris, Iris versicolor,* and *Monotropa uniflora* (M. Smith personal communication 1999). Mosses, particularly *Sphagnum* spp. typically cover nearly 100% of the forest floor. *Dicranum polysetum*, *Sphagnum* spp. (including *Sphagnum magellanicum, Sphagnum recurvum sensu lato, Sphagnum capillifolium*, *Sphagnum russowii*), and *Pleurozium schreberi* are among the species found in this abundant moss layer (Sims *et al.* 1989, Harris *et al.* 1996).

CONSERVATION RANK G5.

DATABASE CODE CEGL002454

COMMENTS

Voyageurs National Park
Diagnostic features of the type are a forested or woodland canopy of *Picea mariana* with or without *Larix laricina.* This community is found in confined peatland basins, on the upland margins of large peatlands, in poorly drained depressions in bedrock, and removed from the water's edge on peatland shorelines. Minerotrophic species may be present. This type is analogous to Ontario's W27 and W28 (Harris *et al.* 1996). In some cases, this community closely resembles more nutrient poor examples of the the Black Spruce Bog (CEGL002485). The Black Spruce/Labrador Tea Poor Swamp will generally contain more minerotrophic indicators than the Black Spruce Bog. Position on the landscape, however, is the best way to distinguish these types. The Black Spruce Bog is found only in the interior of large peatlands whereas the Black Spruce/Labrador Tea Poor Swamp is found in confined basins, shores, and the margins of large peatlands. Where *Larix laricina* exceeds 75%, stands should be placed in the Northern Tamarack Rich Swamp type (CEGL002471).

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Kurmis, V., S. L. Webb, and L. C. Merriam. 1986. Plant communities of Voyageurs National Park, Minnesota, U.S.A. Can. J. Bot. 64:531-540.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

6.6 Northern Shrub Swamps

Cornus spp. - Salix discolor - (Rosa palustris) Shrubland (Dogwood - Pussy Willow Swamp)

COMMON NAME	Red-osier Dogwood - Willow species - (Swamp Rose) Shrubland
SYNONYM	***Dogwood - Pussy Willow Swamp***
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Seasonally flooded cold-deciduous shrubland (III.B.2.N.e)
ALLIANCE	CORNUS SERICEA - SALIX SPP. SEASONALLY FLOODED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type commonly occupies beaver meadows and the shorelines of the large lakes in sheltered bays throughout the park.

Globally

This dogwood-willow shrub swamp community type is found in the upper Midwestern region of the United States in New York, Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, and southern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Dogwood-Pussy Willow Swamp commonly occupies beaver meadows and the shorelines of the large lakes in sheltered bays. It infrequently occurs up to the waters edge but is often found between the upland and a shallow marsh such as the Midwest Cattail Marsh, Wiregrass Sedge Shore Fen, or the Northern Sedge Wet Meadow. A thick (2-5 cm) thatch layer of undecomposed organic matter is common. Soils are either deep peats or shallow peats over dense lacustrine clay. Hummock and hollow microtopography may be present. The water regime is temporarily to seasonally flooded or saturated.

Globally

Stands are found along streams and lakes, or in upland depressions. Hydrology is variable, but is typically seasonally flooded. Soils are wet, organic, and minerotrophic, with either highly decomposed peat or fine mineral soils (Curtis 1959, Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Salix discolor, Salix petiolaris*
Graminoid	*Calamagrostis canadensis, Carex lacustris, Typha latifolia*
Nonvascular	*Aulacomnium palustre, Campylium stellatum, Hypnum lindbergii, Sphagnum* spp., *Drepanocladus* spp., *Calliergon* spp.

Globally

Tall shrub	*Cornus sericea, Salix discolor, Salix petiolaris*
Graminoid	*Calamagrostis canadensis, Carex lacustris, Typha latifolia*

CHARACTERISTIC SPECIES

Voyageurs National Park

Salix discolor, Salix petiolaris, Salix planifolia, Salix serissima, Salix pedicellaris, Salix candida, Salix humilis.

Globally

Salix discolor, Salix petiolaris, Cornus sericea, Rosa palustris

VEGETATION DESCRIPTION

Voyageurs National Park

The Dogwood-Pussy Willow Swamp contains a shrub layer mainly of willows 1-5 meters tall and usually 40-70% cover. The most abundant willow species are *Salix discolor* and *Salix petiolaris*. The following willow species are also common though usually present at low cover*: Salix planifolia, Salix serissima, Salix pedicellaris, Salix candida,* and *Salix humilis*. Shrubs typically absent include *Cornus* spp., *Spiraea alba,* and *Alnus incana*, though they may be present at low cover. Herbaceous cover is typically high (90-100%) and is made up primarily of graminoids, especially *Calamagrostis canadensis* and *Carex lacustris. Typha latifolia, Scirpus cyperinus, Potentilla palustris, Equisetum fluviatile, Iris versicolor, Carex stricta,* and *Acorus calamus* are also common in the herbaceous layer. Mosses may be absent or present around 10-30% cover. Most common species include: *Aulacomnium palustre, Campylium stellatum, Hypnum lindbergii, Sphagnum* spp., *Drepanocladus* spp., *Calliergon cordifolium, Calliergon giganteum,* and *Climacium dendroides*. In some cases, *Sphagnum* spp. may have nearly 100% cover and form a continuous carpet. This occurs primarily when the Dogwood-Pussy Willow Swamp is adjacent to a peatland.

Globally

The vegetation is dominated by tall shrubs between 1 and 3 m tall, with at least 25% cover, and often very dense. More open stands may have high graminoid cover. Trees may be scattered, but cover less than 25%. Composition of the shrub layer is quite diverse, primarily due to the diversity of willow or *Salix* spp., which collectively share dominance with *Cornus sericea*. Willow species include *Salix bebbiana, Salix discolor, Salix eriocephala, Salix exigua (=interior), Salix fragilis*, and *Salix petiolaris*. Other shrubs associates include *Cephalanthus occidentalis* (southeastward), *Cornus amomum, Ribes americanum, Rosa palustris* (more common eastward), *Rubus pubescens* (northward), *Rubus strigosus, Sambucus canadensis, Spirea alba*, and *Viburnum lentago*. Woody vines present include *Clematis virginiana, Parthenocissus quinquifolia*, and *Toxicodendron radicans*. Characteristic herbs include *Asclepias incarnata, Aster simplex, Calamagrostis canadensis, Eupatorium maculatum, Glyceria nervata, Impatiens biflora, Impatiens capensis, Lycopus americanus, Lycopus uniflorus, Phalaris arundinacea, Solidago gigantea*, and *Thalictrum dasycarpum*. A variety of sedges may dominate more open stands, including *Carex lacustris* and *Carex stricta*. Tree species include *Acer rubrum, Fraxinus pennsylvanica*, and *Ulmus americana* (Curtis 1959, White and Madany 1978, Chapman *et al.* 1989, Reschke 1990, Minnesota NHP 1993, Harris *et al.* 1996).

CONSERVATION RANK G5.

DATABASE CODE CEGL002186

COMMENTS

Voyageurs National Park

Diagnostic features of the type are *Salix discolor, Salix petiolaris, Salix planifolia, Salix serissima, Salix pedicellaris, Salix candida,* and *Salix humilis*. The Dogwood-Pussy Willow Swamp is closely related to the Bluejoint Eastern Meadow, the Northern Sedge Wet Meadow, and the Speckled Alder Swamp. Analogous to Ontario's W36 (Harris *et al.* 1996). The willow in the Dogwood-Pussy Willow Swamp can occasionally be mixed with equal amounts of *Alnus incana* or *Betula pumila*. When this occurs, the community grades into the Speckled Alder Swamp or Bog Birch-Leatherleaf Poor Fen. Willows can occasionally invade a Bluejoint Eastern Meadow or a Northern Sedge Wet Meadow. In these circumstances, a shrub layer of < 25% cover distinguish these herbaceous communities from the Dogwood-Pussy Willow Swamp.

Globally

Shrub swamps may naturally succeed herbaceous wet meadows as part of successional series in lakes and ponds. They may also originate from clearing of forested swamps (Curtis 1959), or draining of wet meadows (Minnesota NHP 1993). Infrequent fires may have maintained shrub swamps in the western part of the range, preventing tree canopy closure (Minnesota NHP 1993).

REFERENCES

Anderson, D.A. 1996. The vegetation of Ohio: two centuries of change. Draft. Ohio Biological Survey.

Bakowsky, W.D. and H.T. Lee. 1996. Vegetation communities of southern Ontario (draft). Ontario Natural Heritage Information Centre and Southern Region STTU, Ontario Ministry of Natural Resources, Peterborough, Ontario. 87 p.

Chapman, K.A., D.A. Albert, and G.A. Reese. 1989. Draft descriptions of Michigan's natural community types. Michigan Department of Natural Resources, Lansing, MI. 35 p.

Curtis, J.T. 1959. The vegetation of Wisconsin: An ordination of plant communities. Univ. of Wisconsin Press, Madison. 657 p.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Reschke, C. 1990. Ecological communities of New York state. New York Natural Heritage Program, NY State Department of Environmental Conservation, Latham, NY.

White, J. and M. Madany. 1978. Classification of natural communities in Illinois. In Natural Areas Inventory technical report: Vol. I, survey methods and results, p.311-405. Ill. Nat. Areas Invent., Urbana, IL.

Alnus incana Swamp Shrubland [Provisional] (Speckled Alder Swamp)

COMMON NAME	Speckled Alder Swamp Shrubland
SYNONYM	Speckled Alder Swamp
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Seasonally flooded cold-deciduous shrubland (III.B.2.N.e)
ALLIANCE	ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Voyageurs National Park

This community type occurs throughout the park in isolated low areas surrounded by uplands or as a ring around the edge of less minerotrophic peatlands.

Globally

This alliance is widespread in the Midwest and Northeast United States.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Speckled Alder Swamp occurs in isolated low areas surrounded by upland or as a ring around the edge of less minerotrophic peatlands. Stands can occur on deep peats, shallow peats, or mineral soils where drainage is impeded by clay or dense glacial till. Depending on substrate and topographic placement, they can be temporarily or seasonally flooded or remain saturated throughout the growing season.

Globally

Sites are typically located along streams, lakeshores, edges of beaver meadows, swales associated with small streams in peatlands or upland forests, or near seeps. Most have little to no slope, but some sites are on moderate slopes. Hydrologic conditions can range from temporarily flooded to semipermanently flooded. The water that affects this alliance is non-stagnant, nutrient rich, and often slightly calcareous (Curtis 1959). Soils are wet, often mucks or peats (Anderson 1982, Chapman *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Alnus incana*
Short shrub	*Rubus pubescens*
Graminoid	*Carex lacustris, Calamagrostis canadensis, Typha* spp.
Nonvascular	*Sphagnum centrale, Sphagnum girgensohnii, Sphagnum magellanicum, Mnium* spp., *Drepanocladus* spp., *Climacium dendroides*

Globally

Stratum	Species
Tall shrub	*Alnus incana*
Graminoid	*Calamagrostis canadensis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Alnus incana

Globally

Alnus incana, Calamagrostis canadensis

VEGETATION DESCRIPTION

Voyageurs National Park
Alnus incana shrubs, usually around 2 m tall, usually form a dense canopy in this community. *Salix* spp. and *Betula pumila* may also occur at low cover in the shrub layer with *Alnus incana*. The is a wide variation in the composition of the herbaceous and nonvascular strata largely as a result of the wide range of environmental conditions where this community can exist. In most circumstances, the herbaceous layer ranges from 30-90% and is dominated by *Calamagrostis canadensis, Carex lacustris, Rubus pubescens, Typha* spp.*, Potentilla palustris,* and *Calla palustris*. Some examples of this type contain a nearly continuous carpet of *Sphagnum* spp. moss. In these situations, *Chamaedaphne calyculata* may be found as a dwarf-shrub, and the herbaceous layer may also contain species associated with *Sphagnum* spp. (e.g. *Carex trisperma, Carex disperma, Maianthemum trifolium*). In situations lacking *Sphagnum* spp., the associated species are lacking as well and the nonvascular stratum is minor and consists of *Mnium* spp., *Drepanocladus* spp., and *Climacium dendroides*.

Globally
The vegetation is dominated by tall shrubs, 2-8 meters tall, with a moderately open to dense shrub canopy. There is an understory of shorter shrubs and herbaceous species. The density of the understory varies inversely with the tall shrub canopy. The overstory is usually overwhelmingly dominated by *Alnus incana*, but where it is not as dominant, other shrubs, such as *Cornus sericea, Rubus idaeus, Salix* spp., *Spiraea alba*, and *Viburnum* spp., can be found. The herbaceous layer contains species such as *Aster simplex, Calamagrostis canadensis, Caltha palustris, Carex lacustris, Carex prairea, Eupatorium maculatum, Impatiens capensis, Lycopus uniflorus, Scirpus atrovirens, Symplocarpus foetidus, Thelypteris palustris,* and *Typha* spp. Mosses include *Climacium dendroides*. Where the tall shrub canopy is open, the graminoids can become dense. Trees are found in many stands, including *Acer rubrum, Fraxinus nigra*, and *Thuja occidentalis* (Anderson 1982, Curtis 1959, Harris *et al.* 1996, Minnesota NHP 1993).

CONSERVATION RANK G5?.

DATABASE CODE CEGL002381

COMMENTS
Voyageurs National Park
The diagnostic feature of the type is a tall shrubland dominated by *Alnus incana*. The type is analogous to Ontario's W35 (Harris *et al.* 1996). In situations where willow or bog birch become more dominant, this community grades into the Dogwood-Pussy Willow Swamp or the Bog Birch-Leatherleaf Poor Fen. In non-peatland situations, the Speckled Alder Swamp can have <25% *Fraxinus nigra* canopy over the alder shrub layer. The Black Spruce/Alder Rich Swamp, the Black Spruce-Tamarack Poor Swamp and the Tamarack/Speckled Alder Forest all can resemble the Speckled Alder Swamp but differ in that they contain greater than 25% cover of conifers in the canopy. Likewise, the cedar types (White Cedar-Mixed Conifer/Alder Swamp and White Cedar-Tamarack Peat Swamp) may contain a shrub layer of alder but must have at least 25% cover of conifers in the canopy.

Basins with water levels controlled by beavers can experience fluctuating water levels. Alder often persists after trees such as black spruce or cedar have died from the rising water levels. Outside the park, the Speckled Alder Swamp can be found in wetlands (including peatlands) that have been recently logged.

REFERENCES

6.7 Rock Barrens

Pinus banksiana - (Picea mariana, Pinus strobus) / Vaccinium spp. Rocky Woodland (Boreal Pine Rocky Woodland)

COMMON NAME	Jack Pine - (Black Spruce, White Pine) / Blueberry species Rocky Woodland
SYNONYM	Boreal Pine Rocky Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)
ALLIANCE	PINUS (BANKSIANA, RESINOSA) WOODLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type occurs throughout the park.

Globally

This association is found in northern Minnesota and Manitoba and possible in Ontario and northern Michigan.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community occurs on ridge tops and slopes with 5-50% exposed bedrock. Slopes are highly variable and range from flat to very steep with variable aspects. Vegetation usually occurs on patches where soil has collected over bedrock. The soil in these patches are typically shallow (1-4 cm deep) sandy loams with surficial rocks. These sites are rapidly drained.

Globally

Stands typically occur on shallow, sandy or rocky sites. Soils vary from talus slopes and bare bedrock to deep mineral soils of coarse to fine sand (Sims *et al.* 1989, McCarthy *et al.* 1994).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus banksiana*
Tall shrub	*Abies balsamea, Pinus strobus, Quercus ellipsoidalis*
Short shrub	*Vaccinium angustifolium, Juniperus communis*
Forb	*Aster macrophyllus*
Graminoid	*Danthonia spicata, Agrostis scabra*
Nonvascular	*Pleurozium schreberi, Cladina* spp.

Globally

Stratum	Species
Tree canopy	*Pinus banksiana, Pinus strobus, Pinus resinosa*
Short shrub	*Juniperus communis, Quercus ellipsoidalis, Vaccinium angustfolium*
Nonvascular	*Cladina* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Pinus banksiana, Pinus strobus, Pinus resinosa, Quercus ellipsoidalis, Juniperus communis, Vaccinium angustifolium, Cladina spp.

Globally

Pinus banksiana, Pinus strobus, Pinus resinosa, Juniperus communis, Vaccinium angustifolium, Cladina spp.

VEGETATION DESCRIPTION

Voyageurs National Park

The tree canopy is variable, typically open, with stands often being dominated by a single pine species, typically *Pinus banksiana*, but also either *Pinus resinsa* or *Pinus strobus*, or all three. Occasionally, *Picea mariana* is present. Canopy cover ranges from 30-60% with exposed bedrock preventing the complete closure of the canopy. *Abies balsamea, Pinus strobus*, and *Quercus ellipsoidalis* constitute the shrub layer which, when present, comprises 20-30% cover. Dwarf-shrubs are commonly present at 10-50% cover. In addition to *Vaccinium angustifolium* and *Juniperus communis*, lesser amounts of *Diervilla lonicera, Amelanchier* spp., *Rubus* spp., and *Arctostaphylos uva-ursi* may also be present. The herb layer may be virtually absent or may reach 30% cover and consist of *Aster macrophyllus, Danthonia spicata,* and *Agrostis scabra*. Moss and lichen cover is highly variable, ranging from 20-90%, though most commonly is around 30%. The most abundant moss is *Pleurozium schreberi* while the most abundant lichens are *Cladina rangiferina, Cladina mitis* and *Cladina stellaris.*

Globally

The tree canopy is variable, typically open, with stands often being dominated by a single pine species, but the pines could be *Pinus banksiana*, *Pinus resinsa,* or *Pinus strobus*. Occasionally *Picea mariana* is present. The understory is quite open, with scattered clumps of shrubby *Picea mariana*. *Abies balsamea, Pinus strobus*, and *Quercus ellipsoidalis* constitute the shrub layer which, when present, comprises 20-30% cover. The dwarf-shrub layer contains *Vaccinium angustifolium* and *Vaccinium myrtilloides* with occasional *Juniperus communis*, *Cornus canadensis, Diervilla lonicera, Amelanchier* spp, *Rubus* spp., and *Arctostaphylos uva-ursi*. The herbaceous layer is sparse, containing *Agrostis scabra, Danthonia spicata, Maianthemum canadense*, and *Melampyrum lineare*. Moss and lichen cover is highly variable, ranging from 20-90%, though most commonly around 30%. Moss species include *Dicranum polysetum* and *Pleurozium schreberi*. Lichens include *Cladina rangiferina, Cladina mitis*, and *Cladina stellaris* (Sims *et al.* 1989, McCarthy *et al.* 1994, M. Smith personal communication 1999).

CONSERVATION RANK G4?.

DATABASE CODE CEGL002483

COMMENTS

Voyageurs National Park

Diagnostic features of the type are canopy of *Pinus banksiana*, *Pinus resinosa, Pinus strobus*, in pure or mixed combinations, with less than 60% cover and canopy closure prevented by the presence of bedrock. Stands on Dryweed Island (on greenstone bedrock) are distinct from the stands that occur in the rest of the park, presumably because of the differences in underlying bedrock, but a wider survey is needed to verify these patterns. This type is similar to Jack Pine/Lichen Rocky Barrens Community but with greater than 25% cover of trees, especially *Pinus banksiana*. When deciduous trees, especially *Quercus ellipsoidalis,* are co-dominant with *Pinus banksiana*, the community grades into the Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland (CEGL005246).

REFERENCES

McCarthy, T.G., R.W. Arnup, J. Nieppola, B.G. Merchant, K.C. Taylor, and W.J. Parton. 1994. Field Guide to Forest Ecosystems of Northeastern Ontario. NEST Field Guide FG-001, Ontario Ministry of Natural Resources, Northeast Science and Technology, Timmins ON.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Pinus banksiana - Mixed Conifer / Cladina spp. Nonvascular Vegetation (Jack Pine / Lichen Rocky Barrens)

COMMON NAME	Jack Pine - Mixed Conifer / Reindeer Lichen species Nonvascular Vegetation
SYNONYM	Jack Pine / Lichen Rocky Barrens
PHYSIOGNOMIC CLASS	Nonvascular Vegetation (VI)
PHYSIOGNOMIC SUBCLASS	Lichen vegetation (VI.B)
PHYSIOGNOMIC GROUP	Temperate or subpolar lichen vegetation (VI.B.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VI.B.1.N)
FORMATION	Lichen vegetation with a sparse tree layer (VI.B.1.N.c)
ALLIANCE	PINUS BANKSIANA / CLADINA SPP. NONVASCULAR ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This community is common to some areas of the park. In the northern part of the park, it can be found in Anderson Bay and, less abundantly, in Daley Bay.

Globally

This association is found in northern Minnesota, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs on ridge tops and high slopes with 40-80% exposed bedrock. Slopes are highly variable and range from gentle to very steep with variable aspects. Vegetation usually occurs on patches where soil has collected over bedrock. The soil in these patches are typically shallow (1-3 cm deep) loams. These sites are rapidly drained.

Globally

This type occurs on ridge tops and high slopes with 40-80% exposed bedrock. Stands are typically comprised of granite or metamorphic rock, and possibly basalt. Slopes are highly variable and range from gentle to very steep with variable aspects. These sites are rapidly drained. Vegetation usually occurs on patches where soil has collected over bedrock. The soil in these patches are typically shallow (1-3 cm deep) loams, soil development is minimal, and pH is typically acid (Ohmann and Ream 1971, Grigal and Ohmann 1975, Minnesota NHP 1993, M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus banksiana*
Tall shrub	*Quercus ellipsoidalis*
Short shrub	*Vaccinium angustifolium, Juniperus communis*
Graminoid	*Danthonia spicata, Agrostis scabra*
Nonvascular	*Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Pinus banksiana*
Tall shrub	*Quercus ellipsoidalis*
Short shrub	*Vaccinium angustifolium, Juniperus communis*
Graminoid	*Danthonia spicata, Agrostis scabra*
Nonvascular	*Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi*

CHARACTERISTIC SPECIES

Voyageurs National Park

Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi, Pinus banksiana, Quercus ellipsoidalis,

Vaccinium angustifolium, Juniperus communis, Danthonia spicata, Agrostis scabra

Globally
Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi, Pinus banksiana, Quercus ellipsoidalis, Vaccinium angustifolium, Juniperus communis, Danthonia spicata, Agrostis scabra

VEGETATION DESCRIPTION
Voyageurs National Park
In this community, *Pinus banksiana* is the only tree dominant in the canopy. These trees are usually 10-15 meters tall and are present at less than 25% cover. Vascular vegetation is usually present in clumps underneath the canopy of *Pinus banksiana* trees. The short scrub or shrubs *Quercus ellipsoidalis, Abies balsamea,* and/or *Amelanchier* spp. may be absent or present at low cover. A dwarf-shrub layer is nearly always present, usually at 10-30% cover. The most abundant dwarf-shrubs are *Vaccinium angustifolium, Juniperus communis* var. *depressa*, and *Prunus pumila*. The herbaceous layer is poorly developed and may be absent. When present, it comprises 5-10% cover and primarily consists of *Danthonia spicata, Agrostis scabra, Corydalis sempervirens*, and *Woodsia ilvensis*. The nonvascular strata in this community typically comprises 30-50% cover, not including crustose lichens. Depending on substrate and slope, nonvascular cover can be as low as 10%. Dominant species are the lichens *Cladina rangiferina, Cladina mitis, Cladina stellaris, Stereocaulon* spp., and the mosses *Pleurozium schreberi*, *Polytrichum juniperinum, Polytrichum piliferum, Hedwigia ciliata,* and *Orthotrichum* spp.

Globally
Occurrences are typically a mosaic of exposed bedrock with patches of low vegetation dominated by fructicose lichens and mosses, which cover about 40% of the area. Bare rock covers about 30% of the area. Lichen species include *Cladina rangiferina, Cladina stellaris,* and *Cladina mitis*. Mosses include *Dicranum* spp., *Hedwigia ciliata, Orthotrichum* spp., *Pleurozium schreberi, Polytrichum juniperinum, Polytrichum piliferum*, and *Stereocaulon* spp. The vascular vegetation is typically sparse. Scattered trees and tall shrubs include *Abies balsamea, Amelanchier* spp*., Pinus banksiana, Prunus pensylvanica*, and *Salix bebbiana*. A dwarf-shrub layer is nearly always present usually at 10-30% cover. The most abundant dwarf-shrubs are *Diervilla lonicera, Vaccinium angustifolium, Juniperus communis* and *Prunus pumila*. The sparse herbaceous layer includes *Aralia hispidus, Corydalis sempervirens, Danthonia spicata, Sibbaldiopsis (=Potentilla) tridentata*, and *Woodsia ilvensis* (Ohmann and Ream 1971, Grigal and Ohmann 1975, Minnesota NHP 1993, M. Smith personal communication 1999).

CONSERVATION RANK G3G5.

DATABASE CODE CEGL002491

COMMENTS
Voyageurs National Park
Diagnostic features of the type are the dominance of nonvascular vegetation, with <25% cover of trees or shrubs and only scattered herbaceous vegetation. When trees are present, *Pinus banksiana* is most typical. When canopy cover of *Pinus banksiana* reaches 25%, this community grades into the Boreal Pine Rocky Woodland (CEGL002483).

REFERENCES

Grigal, D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecol. Monogr. 45:389-407.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F. and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN. U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Populus tremuloides - (Populus grandidentata) Rocky Woodland (Mixed Aspen Rocky Woodland)

COMMON NAME	Trembling Aspen - (Bigtooth Aspen) Rocky Woodland
SYNONYM	Mixed Aspen Rocky Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Deciduous woodland (II.B)
PHYSIOGNOMIC GROUP	Cold-deciduous woodland (II.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.B.2.N)
FORMATION	Cold-deciduous woodland (II.B.2.N.a)
ALLIANCE	POPULUS TREMULOIDES WOODLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type occurs in localized upland areas throughout the park.

Globally

This association is found in northern Michigan, northern Minnesota, Manitoba, and probably Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community occurs on bedrock ridges with shallow soils. Soils range from non-existent on bedrock openings to 8-12 cm loams or sandy loams in low areas where soil has developed. Slopes are generally gentle (1-10%) with variable aspects. Exposed bedrock ranges from 5-20%. These sites are rapidly drained.

Globally

This community occurs on bedrock ridges with shallow soils. Soils range from non-existent on bedrock openings to 8-12 cm loams or sandy loams in low areas where soil has developed. Slopes are generally gentle (1-10%) with variable aspects. Exposed bedrock ranges from 5-20%. These sites are rapidly drained (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera Populus grandidentata*
Tree sub-canopy	*Abies balsamea, Betula papyrifera*
Tall shrub	*Corylus cornuta, Acer rubrum, Populus tremuloides*
Short shrub	*Vaccinium* spp.
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Graminoid	*Schizachne purpurascens*
Nonvascular	*Pleurozium schreberi, Cladina* spp.

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera Populus grandidentata*
Tree sub-canopy	*Abies balsamea, Betula papyrifera*
Tall shrub	*Corylus cornuta, Acer rubrum, Populus tremuloides*
Short shrub	*Vaccinium* spp.
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Graminoid	*Schizachne purpurascens*
Nonvascular	*Pleurozium schreberi, Cladina* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Populus tremuloides, Populus grandidentata, *Betula papyrifera, Vaccinium* spp., *Schizachne purpurascens, Pleurozium schreberi, Cladina* spp.

Globally

Populus tremuloides, Populus grandidentata, *Betula papyrifera, Vaccinium* spp., *Schizachne purpurascens, Pleurozium schreberi, Cladina* spp.

VEGETATION DESCRIPTION

Voyageurs National Park

The canopy of this type usually consists of a mix *of Populus tremuloides, Betula papyrifera* and, occasionally, *Populus grandidentata*. Percent cover ranges from 20-60%. There is often a subcanopy (usually about 30% cover) containing the species in the canopy as well as *Abies balsamea, Acer rubrum* and, less commonly*, Quercus ellipsoidalis*. In the patches of soil that exist between the bedrock outcrops, vegetation can be more forest-like. These areas contain a short shrub layer of *Corylus cornuta* and *Populus* spp., with cover ranging from 20-90%. The herb layer in these patches consists of *Aralia nudicaulis, Pteridium aquilinum,* and *Aster macrophyllus* with cover typically in the 60-70% range. The bedrock outcrops often contain a low cover of *Vaccinium* spp. The herb layer associated with bedrock typically contains *Woodsia ilvensis, Schizachne purpurascens,* and *Agropyron trachycaulum*, with cover usually low (less than 25%). These bedrock areas may also contain a low cover of *Pleurozium schreberi*, *Cladina rangiferina, Cladina mitis,* and *Cladina stellaris*.

Globally

The canopy of this type usually consists of a mix *of Populus tremuloides, Betula papyrifera,* and, occasionally, *Populus grandidentata*. Percent cover ranges from 20-60%. There is often a subcanopy (usually about 30% cover) containing the species in the canopy as well as *Abies balsamea, Acer rubrum,* and, less commonly*, Quercus ellipsoidalis*. In the patches of soil that exist between the bedrock outcrops, vegetation can be more forest-like. These areas contain a short shrub layer of *Corylus cornuta* and *Populus* spp. with cover ranging from 20-90%. The herb layer in these patches consists of *Aralia nudicaulis, Pteridium aquilinum,* and *Aster macrophyllus* with cover typically in the 60-70% range. The bedrock outcrops often contain a low cover of *Vaccinium* spp. The herb layer associated with bedrock typically contains *Woodsia ilvensis, Schizachne purpurascens,* and *Agropyron trachycaulum*, with cover usually low (less than 25%). These bedrock areas may also contain a low cover *of Pleurozium schreberi* and *Cladina rangiferina, Cladina mitis* and *Cladina stellaris* (M. Smith personal communication 1999).

CONSERVATION RANK G?.

DATABASE CODE CEGL002487

COMMENTS

Voyageurs National Park

Diagnostic features of the type are the canopy of *Populus tremuloides, Populus grandidentata*, and/or *Betula papyrifera*, with less than 60% cover and canopy closure prevented by the presence of exposed bedrock. When canopy cover is greater than 60% and canopy closure is not prevented by the presence of exposed bedrock, the community is considered an Aspen-Birch/Boreal Conifer Forest (CEGL002466). Some stands intermediate between these two communities exist. Vegetation indicative of exposed bedrock conditions should be present for the stand to be considered a Mixed Aspen Rocky Woodland. If woodland physiognomy is evident and the canopy is a mixture of aspen/birch and other conifers, this type can grade into Northern Pin Oak-Bur Oak-(Jack Pine) Rocky Woodland (CEGL005246), but that type has at least 20% oaks in the canopy.

Globally

This type may originate after fires or logging, and many stands may not have a natural origin.

REFERENCES

Quercus ellipsoidalis - Quercus macrocarpa - (Pinus banksiana) Rocky Woodland [Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland]

COMMON NAME	Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland
SYNONYM	Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Deciduous woodland (II.B)
PHYSIOGNOMIC GROUP	Cold-deciduous woodland (II.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.B.2.N)
FORMATION	Cold-deciduous woodland (II.B.2.N.a)
ALLIANCE	QUERCUS MACROCARPA - QUERCUS (ALBA, ELLIPSOIDALIS, VELUTINA) WOODLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type occurs on ridge tops and high slopes throughout the park.

Globally

This association is found in northern Minnesota, Ontario, and Manitoba.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs on ridge tops and high slopes, and some dry, flat, rocky areas. Slopes range from 0-20% with variable aspects. These sites are generally dry, well drained sites with exposed bedrock typical in the more open stands and commonly covering 10-30% of the ground. In stands with more closed canopies exposed bedrock may be absent. In both cases, soils are fairly rocky, shallow loams, averaging 3-5 cm deep. Occasional cracks in the underlying bedrock results in pockets of relatively deep (15-20 cm) soil.

Globally

This type occurs on ridge tops and high slopes, and some dry, flat, rocky areas. Slopes range from 0-20% with variable aspects. These sites are generally dry, well drained sites with exposed bedrock typical in the more open stands and commonly covering 10-30% of the ground. In stands with more closed canopies exposed bedrock may be absent. In both cases, soils are fairly rocky, shallow loams, averaging 3-5 cm deep. Occasional cracks in the underlying bedrock results in pockets of relatively deep (15-20 cm) soil.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus banksiana, Pinus resinosa, Pinus strobus, Quercus ellipsoidalis, Populus tremuloides*
Tall shrub	*Corylus cornuta, Viburnum rafinesquianum, Quercus ellipsoidalis, Amelanchier* spp., *Abies balsamea*
Short shrub	*Vaccinium angustifolium, Juniperus communis*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Pinus banksiana, Quercus ellipsoidalis*
Tall shrub	*Corylus cornuta, Viburnum rafinesquianum, Quercus ellipsoidalis, Amelanchier* spp.
Short shrub	*Vaccinium angustifolium, Juniperus communis*

Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi*

CHARACTERISTIC SPECIES

Voyageurs National Park

Pinus banksiana, Quercus ellipsoidalis, Corylus cornuta, Viburnum rafinesquianum, Quercus ellipsoidalis, Amelanchier spp., *Vaccinium angustifolium, Juniperus communis Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Danthonia spicata, Cladina rangiferina, Cladina mitis, Cladina stellaris, Pleurozium schreberi*

Globally

Information not available.

VEGETATION DESCRIPTION

Voyageurs National Park

This type is characterized by either a canopy dominated by *Quercus ellipsoidalis*, with occasional *Quercus macrocarpa* or *Pinus banksiana* or with large *Pinus banksiana*, *Pinus resinosa*, or *Pinus strobus* either forming an emergent canopy over the oak trees, or mixed with the oaks. These evergreen trees may have 25-75% cover. Thus the canopy of this type varies from pure deciduous to mixed evergreen-deciduous. Stands may also vary in canopy cover from 30% ("woodland" physiognomy) to 90% ("forest" physiognomy). It is common for open bedrock ridges with oak to be found in a mosaic with more closed oak stands. In both circumstances, *Corylus cornuta*, *Viburnum rafinesquianum, Quercus ellipsoidalis,* and *Amelanchier* spp. are the most abundant species in the shrub layers and usually cover 20-40% of the forest floor. *Vaccinium angustifolium* is the most common dwarf-shrub and is present at low (<25%) cover. In stands with much exposed bedrock, the dwarf-shrubs *Juniperus communis, Prunus pumila, Arctostaphylos uva-ursi,* and *Comptonia peregrina* may also be present. Cover of the herbaceous layer is highly variable, ranging from 20-80%, with the most abundant herbs being *Pteridium aquilinum, Aster macrophyllus,* and *Aralia nudicaulis*. Species typical of bedrock outcrops and shallow soils can also be found and include *Danthonia spicata, Poa alsodes, Agropyron trachycaulum, Maianthemum canadense, Schizachne purpurascens*, and *Oryzopsis asperifolia*. The nonvascular layer can be absent or present with up to 30% cover. In the open bedrock areas this layer consists mainly of the lichens *Cladina rangiferina, Cladina mitis, Cladina stellaris,* and, to a lesser degree, the mosses *Polytrichum juniperinum, Polytrichum piliferum, Hedwigia ciliata,* and *Orthotrichum* spp. Under the canopy of oaks, the nonvascular strata consist primarily of *Pleurozium schreberi* and *Dicranum* spp.

Globally

This type is characterized by either a canopy dominated by *Quercus ellipsoidalis*, with occasional *Quercus macrocarpa* or *Pinus banksiana*, or with large *Pinus banksiana*, *Pinus resinosa*, or *Pinus strobus* either forming an emergent canopy over the oak trees, or mixed with the oaks. These evergreen trees may have 25-75% cover. Thus, the canopy of this type varies from pure deciduous to mixed evergreen-deciduous. Stands may also vary in canopy cover from 30% (woodland physiognomy) to 90% (forest physiognomy). It is common for open bedrock ridges with oak to be found in a mosaic with more closed oak stands. In both circumstances, *Corylus cornuta*, *Viburnum rafinesquianum, Quercus ellipsoidalis,* and *Amelanchier* spp. are the most abundant species in the shrub layers and usually cover 20-40% of the forest floor. *Vaccinium angustifolium* is the most common dwarf-shrub and is present at low (<25%) cover. In stands with much exposed bedrock, the dwarf-shrubs *Juniperus communis, Prunus pumila, Arctostaphylos uva-ursi,* and *Comptonia peregrina* may be present. Cover of the herbaceous layer is highly variable, ranging from 20-80%, with the most abundant herbs being *Pteridium aquilinum, Aster macrophyllus,* and *Aralia nudicaulis*. Species typical of bedrock outcrops and shallow soils can also be found and include *Danthonia spicata, Poa alsodes, Agropyron trachycaulum, Maianthemum canadense, Schizachne purpurascens*, and *Oryzopsis asperifolia*. The nonvascular layer can be absent or present with up to 30% cover. In the open bedrock areas this layer consists mainly of the lichens *Cladina rangiferina, Cladina mitis, Cladina stellaris,* and, to a lesser degree, the mosses *Polytrichum juniperinum, Polytrichum piliferum, Hedwigia ciliata,* and *Orthotrichum* spp. Under the canopy of oaks, the nonvascular strata consist primarily of *Pleurozium schreberi* and *Dicranum* spp.

CONSERVATION RANK G?

DATABASE CODE CEGL005246

COMMENTS

Voyageurs National Park

Diagnostic features of the type include the forest or woodland canopy consisting primarily of *Quercus ellipsoidalis*, with varying amounts of *Quercus macrocarpa*, *Pinus banksiana, Pinus resinosa,* and *Pinus strobus*, and a rocky substrate, with dry herbaceous, moss, and lichen species. Though there are some differences, community analysis indicates that the floristic similarities between the oak woodland and the oak forest warrant including them as open and closed version of the same type. This type lacks *Abies balsamea*, whereas the Boreal Pine Rocky Woodland (CEGL002483) usually contains it. Stands of this type on Dryweed Island appear to be distinct from the stands that occur in the rest of the park, presumably because of the differences in underlying greenstone bedrock. In the case of *Quercus macrocarpa* being dominant in the canopy, this type includes only those stands with exposed bedrock and woodland physiognomy. Forested mesic situations with *Quercus macrocarpa* are included in the Northern Bur Oak Mesic Forest.

REFERENCES

Kurmis, V., S. L. Webb, and L. C. Merriam. 1986. Plant communities of Voyageurs National Park, Minnesota, U.S.A. Can. J. Bot. 64:531-540.

Sims, R. A., W. D. Towill, K. A. Baldwin, P. Uhlig, and G. M. Wickware. 1997. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, North West Science and Technology, Thunder Bay, ON. Field Guide FG-03. 176 p.

Corylus cornuta - Amelanchier spp. - Prunus virginiana Rocky Shrubland (Boreal Hazelnut - Serviceberry Rocky Shrubland)

COMMON NAME	Beaked Hazelnut - Serviceberry species - Choke Cherry Rocky Shrubland
SYNONYM	Boreal Hazelnut - Serviceberry Rocky Shrubland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temperate cold-deciduous shrubland (III.B.2.N.a)
ALLIANCE	CORYLUS CORNUTA - AMELANCHIER SPP. SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type occurs widely in small pockets throughout the park.

Globally

This association is found in northern Minnesota, northern Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Boreal Hazelnut-Serviceberry Rocky Shrubland occurs on a wide variety of slopes, soils, topographic positions and moisture regimes. This community typically arises because of natural or human disturbance, most commonly beavers, fire, logging and blowdowns. (See Natural Disturbance). This community can also occur without disturbance, usually on ridgetops. These sites, however, are usually so small that they are often included within other communities.

Globally

This type occurs on a wide variety of slopes, soils, topographic positions and moisture regimes. It typically arises because of natural or human disturbance, most commonly beavers, fire, logging and blowdowns. This community can also occur without disturbance, usually on dry rock ridgetops that have thin, acidic soils. These sites, however, are usually so small that they are often included within other communities (C. Reschke personal communication 1999, M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tall shrub	*Acer spicatum, Populus tremuloides, Corylus cornuta, Abies balsamea*
Short shrub	*Rubus strigosus*
Forb	*Aster macrophyllus, Polygonum cilinode*
Fern	*Pteridium aquilinum*

Globally

Stratum	Species
Tall shrub	*Corylus cornuta,*
Short shrub	*Diervilla lonicera, Amelanchier* spp.
Forb	*Aster macrophyllus, Hieracium piloselloides*

CHARACTERISTIC SPECIES

Voyageurs National Park

Acer spicatum, Corylus cornuta, Abies balsamea, Rubus strigosus, Polygonum cilinode

Globally

Corylus cornuta, Diervilla lonicera, Amelanchier spp., *Hieracium piloselloides*

VEGETATION DESCRIPTION

Voyageurs National Park

This shrub community usually contains a dense (70-90% cover) shrub canopy of *Acer spicatum, Populus tremuloides, Corylus cornuta* and/or *Abies balsamea*. Trees may be absent or present with less than 25% cover over the shrub layer. Trees species varies depending on the site. Where the canopy of tall shrubs is more open, short shrubs such as *Rubus strigosus, Taxus canadensis, Rubus pubescens,* and *Juniperus communis* exist at low to moderate cover. Density and composition of the herbaceous strata is highly variable. The most common species include *Aster macrophyllus, Pteridium aquilinum* and *Polygonum cilinode*. On wetter sites, herbaceous species such as *Calamagrostis canadensis* and *Scirpus cyperinus* may dominate.

Globally

The vegetation is dominated by shrubs, with a strong graminoid layer. Dominant shrubs include *Amelanchier* spp., *Corylus cornuta*, and *Prunus virginiana*. Other shrubs include *Acer spicatum, Juniperus communis, Rosa acicularis*, and *Rhus typhina*. Associated herbs include *Danthonia spicata, Hieracium* spp., and *Poa compressa*. At Isle Royale NP, this boreal rocky shrubland is a deciduous shrubland with variable physiognomy and composition. This community often has a sparse tree layer, with about 5 to 20% cover of trees over 5 m tall. The speceis are quite variable, but the most common trees are *Picea glauca* and *Populus tremuloides*. The tall shrub layer varies from 0 to 70% cover. On Isle Royale, the most abundant tall shrubs are *Corylus cornuta*, *Crataegus douglasii, Picea glauca, Prunus pensylvanica*, and *Sorbus decora*; the short shrub layer (including dwarf-shrubs) varies from about 10 to 80% cover, with the most abundant short shrubs being *Diervilla lonicera, Amelanchier* sp., *Rubus parviflorus, Juniperus communis, Rubus idaeus, Rosa acicularis*, and *Arctostaphylos uva-ursi*. At Voyageurs NP the tall shrub layer contains *Acer spicatum, Populus tremuloides, Corylus cornuta* and/or *Abies balsamea*; where the canopy of tall shrubs is more open, short shrubs such as *Rubus strigosus, Rubus pubescens, Taxus canadensis* and *Juniperus communis* exist at low to moderate cover. On Isle Royale the herb layer varies from 5 to 80% cover; the most abundant herbs are *Aster macrophyllus, Hieracium piloselloides, Clinopodium vulgare, Poa compressa, Danthonia spicata*, and *Pteridium aquilinum*. The cover of nonvascular plants varies from about 5 to 60% cover, with lichens (including *Cladina* spp.), and mosses. At Voyaguers, the density and composition of the herbaceous strata is highly variable. The most common species include *Aster macrophyllus, Pteridium aquilinum* and *Polygonum cilinode*. On wetter sites, herbaceous species such as *Calamagrostis canadensis and Scirpus cyperinus* may dominate. (C. Reschke personal communication 1999, M. Smith personal communication 1999).

CONSERVATION RANK G?.

DATABASE CODE CEGL005197

COMMENTS

Voyageurs National Park

Diagnostic features of the type are the upland deciduous shrubs with over 25% cover and trees with less than 25% cover. These stands generally classify best with the types that match the previous tree canopy that existed on the site. When trees approach 25% cover, the Boreal Hazelnut-Serviceberry Rocky Shrubland can grade into whatever community is appropriate for the tree canopy. This type can have patches of exposed bedrock but tree canopy closure is not prevented by it.

This community typically arises because of a wide variety of disturbances. Outside the park (and in some locations within the park) this shrub community arises after logging has removed the tree canopy. In these circumstances, the shrubs are typically dense *Populus tremuloides* saplings. This community is also common on slopes above beaver ponds where beaver have removed all or most of the tree canopy. In these situations, the shrubs are usually dense *Corylus cornuta* and *Acer spicatum*. The Boreal Hazelnut-Serviceberry Rocky Shrubland can also occur on ridge tops, high slopes and other places where high winds have blown down the trees in the canopy. Finally, this community also arises after fire has killed the trees in the canopy.

Globally

This community often has evidence of past fires; it can be a successional stage following a severe burn. It seems to be an intermediate successional stage after Poverty grass barrens that may gradually develop into a woodland. Soils are often very shallow, and successional development is very slow on the exposed rocky summits where this community is found; so the community may be a fairly long-lived and stable successional stage (C. Reschke personal communication 1999). This type can also arise after logging has removed the tree canopy. In these circumstances, the shrubs are typically dense *Populus tremuloides* saplings. This community is also common on slopes above beaver ponds where beaver have removed all or most of the tree canopy. In these situations, the shrubs

are usually dense *Corylus cornuta* and *Acer spicatum*. Finally this type can also occur on ridge tops, high slopes and other places where high winds have blown down the trees in the canopy (M. Smith personal communication 1999).

REFERENCES

Danthonia spicata - Poa compressa Granite Herbaceous Vegetation (Poverty Grass Granite Barrens)

COMMON NAME	Poverty Grass Canada Bluegrass Grnite Herbaceous Vegetation
SYNONYM	***Poverty Grass Granite Barrens***
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Medium-tall sod temperate or subpolar grassland (V.A.5.N.c)
ALLIANCE	DANTHONIA SPICATA HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type primarly represents localized disturbed sites around abandoned cottages in and around the park.

Globally

This association is found in Minnesota, Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Sites are typically disturbed, shallow soil sites.

Globally

Stands occur on granite or metamorphic rocks. Soils are thin and acidic. Conditions at Isle Royale National Park, where this community is restricted to rocky summits and rocky slopes of ridges where a lot of bedrock is exposed, may be typical of the type (C. Reschke 1999). It may also occur on disturbed sites, following clearing of the natural vegetation (M. Smith personal communication).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species

Globally

Stratum	Species
Short shrub	*Juniperus communis, Amelanchier bartramiana, Diervilla lonicera*
Forb	*Hieracium piloselloides*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina* spp., *Xanthoparmelia* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

Danthonia spicata, Hieracium piloselloides, Cladina spp., *Xanthoparmelia* spp.

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not described in the park proper but is thought to occur on nearby private land. See the global description for some characteristics of the type.

Globally

The vegetation is open and dominated by graminoids. Characteristic dominants include *Danthonia spicata* and *Poa compressa*. Features at Isle Royale NP may be typical of the type. There, a sparse cover of trees over 5 m tall (from

0 to 20% cover) is found. The most common trees are *Picea glauca* and *Populus tremuloides*. Cover of tall shrubs may be present (from 0 to 10% cover); the most common tall shrubs are *Picea glauca, Amelanchier bartramiana*, and *Crataegus douglasii*. Cover of low shrubs (under 1 m tall, including dwarf-shrubs) varies from 5 to 20% cover; the most common low shrubs are *Juniperus communis, Amelanchier bartramiana, Diervilla lonicera, Rosa acicularis*, *Juniperus horizontalis*, and *Arctostaphylos uva-ursi*. Cover of herbs varies from 30 to 80% cover; *Danthonia spicata* is the dominant herb (15 to 40% cover), other characteristic herbs are *Hieracium piloselloides, Agrostis hyemalis, Clinopodium vulgare, Elymus trachycaulus*, and *Poa* spp. Cover of nonvascular plants varies from 10 to 60% cover; the most abundant lichens are *Cladina* spp. (reindeer lichens, 5 to 25% cover) and *Xanthoparmelia* spp. (1 to 5% cover) (C. Reschke personal communication 1999).

CONSERVATION RANK G?.

DATABASE CODE CEGL005157

COMMENTS

Voyageurs National Park

This type, which primarily represents localized disturbed sites around abandoned cottages, was not described. A variety of native and exotic species can be found on these sites. It occurs mainly on private lands so sampling was not possible.

Globally

This type may arise after clearing or burning of conifer-dominated stands on rocky sites.

REFERENCES

6.8 Northern White Cedar-(Hardwood) Forests

Thuja occidentalis / Abies balsamea - Acer spicatum Forest (White Cedar - Boreal Conifer Mesic Forest)

COMMON NAME	Northern White-cedar / Balsam Fir - Mountain Maple Forest
SYNONYM	White Cedar - Boreal Conifer Mesic Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	THUJA OCCIDENTALIS FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This community occurs in small patches in localized areas throughout the park, typically on moderate slopes. In the southwestern park of the park it occurs on more flat terrain.

Globally

This community is found in northern Minnesota, northern Wisconsin, northern Michigan, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

In the southwest part of the park, this type usually occurs on flat terrain over deep, poorly drained silt clay loams. In the rest of the park, this community is commonly found on gently sloping terrain, often on toeslopes, located just above wetland communities. There is usually very little surficial bedrock. The soils are typically 7-10 cm loams over dense lacustrine clay. In some cases, a shallow build up of well decomposed peat may be present. Hummocks and hollows formed from fallen trees and build up of organic debris may be absent or well developed.

Globally

This community is found on gentle wet-mesic slopes to very steep well-drained slopes (MN NHP 1993). The predominant aspect is north to northeast. Soils are moderately deep to deep (50-100 cm), calcareous, coarse to fine textured, and often contain boulders at the surface (Ohmann and Ream 1971, Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tall shrub	*Abies balsamea, Acer spicatum*
Short shrub	*Rubus pubescens*
Forb	*Mitella nuda, Aralia nudicaulis*
Fern	*Dryopteris carthusiana, Equisetum sylvaticum*
Nonvascular	*Rhytidiadelphus triquetrus, Calliergon* spp., *Mniaceae*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tree subcanopy	*Abies balsamea*

CHARACTERISTIC SPECIES

Voyageurs National Park

Thuja occidentalis, Abies balsamea, Acer spicatum, Rubus pubescens

Globally
Thuja occidentalis, Abies balsamea, Acer spicatum, Coptis trifolia

VEGETATION DESCRIPTION
Voyageurs National Park
The White Cedar-Boreal Conifer Forest generally exhibits a completely closed canopy of *Thuja occidentalis* (90-100% cover). In rare cases, canopy cover may be as low as 60%. *Fraxinus nigra* and, less commonly, *Populus balsamifera* and *Populus tremuloides* can also occur in the canopy or emergent layers at less than 25% cover. There is no sub-canopy, but occasionally a tall shrub layer occurs with about 25% cover of *Abies balsamea*. *Acer spicatum* can also occur in canopy openings. The cover of herbaceous species is highly variable, ranging from 10-90%. *Rubus pubescens, Dryopteris carthusiana, Mitella nuda, Equisetum sylvaticum,* and *Aralia nudicaulis* are the most abundant. The dominant bryophytes are *Rhytidiadelphus triquetrus, Climacium dendroides, Calliergon cordifolium, Calliergon giganteum,* and mosses in the *Mniaceae* (the *Mnium* family). The cover of this nonvascular strata can range from virtually non-existent to about 40% cover.

Globally
The overstory is dominated by coniferous trees, with or without a substantial deciduous component. *Thuja occidentalis* is the most abundant tree and may occur in pure stands. Usually there are other canopy species, especially *Abies balsamea, Betula papyrifera, Picea glauca, Picea mariana, Populus tremuloides*, and *Pinus strobus*. There is usually an abundant shrub/sapling layer with saplings of *Thuja occidentalis* and *Abies balsamea* along with the shrubs *Acer spicatum, Corylus cornuta, Linnaea borealis, Lonicera canadensis, Rubus pubescens*, and *Sorbus decora*. The ground layer is typically diverse on mesic to wet-mesic stands and less so on steep drier stands. Wet-mesic stands can contain a hummock and hollow topography, with a seasonally saturated hydrology. Typical species include *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Mitella nuda*, and *Trientalis borealis*. Mosses include *Drepanocladus uncinatus, Hylocomium splendens, Plagiomnium cuspidatum, Pleurozium schreberi, Ptilium crista-castrensis*, and *Rhytidiadelphus triquestrus* and, in wetter phases of the type, *Sphagnum* spp (Ohmann and Ream 1971, Sims *et al.* 1989, Chambers *et al.* 1997).

CONSERVATION RANK G4.

DATABASE CODE CEGL002449

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy of *Thuja occidentalis* without *Alnus incana* shrubs or *Sphagnum* spp. moss. In contrast to the White Cedar/Alder Swamp community, the White-Cedar Boreal Conifer Forest generally does not contain *Alnus incana* in the shrub layer or significant cover of *Sphagnum* spp. moss. Intermediate stands, however, do exist. When *Populus* spp. are present in the emergent layer or canopy approaching 25% relative cover, this community can grade into the White Cedar-Yellow Birch Forest.

Fraxinus nigra is commonly found mixed in the canopy with *Thuja occidentalis*. When cover of *Fraxinus nigra* in the canopy is greater than 25%, the stand becomes a White Cedar-Black Ash Swamp. The White Cedar-Black Ash Swamp is typically wetter than the White Cedar Boreal Forest, often containing standing water in the hollows and *Alnus incana* shrubs. Many stands intermediate between the two types exist.

Globally
Browsing by deer can be a serious hindrance to *Thuja occidentalis* reproduction (MN NHP 1993).

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F., and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Thuja occidentalis - Betula alleghaniensis Forest (White Cedar - Yellow Birch Forest)

COMMON NAME	White-cedar - Yellow Birch Forest
SYNONYM	White Cedar - Yellow Birch Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	THUJA OCCIDENTALIS - BETULA ALLEGHANIENSIS FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is most commonly found in the environs south and southwest of the park, but also occurs less commonly in the southern part of the park on flat terrain.

Globally

This community is found in northern Minnesota, northern Wisconsin, northern Michigan, and Ontario. It is reported from two ecoregion subsections in the western Lake Superior basin.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs on flat or gently sloping terrain with variable aspects. It frequently occupies toeslopes located just above wetland communities. There is usually very little surficial bedrock. Soils contain a shallow (1-5 cm) organic layer over 5-15 cm of loam or silt loam over dense lacustrine clay. In some cases, a shallow build up of well decomposed peat may be present. Microtopography is typically flat. Coarse woody debris is often abundant.

Globally

This community is found on both poorly drained lowland soils, occasionally bordering on wet, organic soils (Beals and Cottam 1960, Chambers *et al.* 1997), and gentle to somewhat steep northerly slopes (C. Reschke personal communication 1999). The soil is typically moderately acidic sandy clay with a thin litter layer.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Emergent tree	*Populus tremuloides, Populus balsamifera*
Tree canopy	*Thuja occidentalis, Abies balsamea*
Tall shrub	*Abies balsamea, Acer spicatum, Corylus cornuta*
Short shrub	*Rubus pubescens*
Forb	*Mitella nuda, Aralia nudicaulis*
Fern	*Lycopodium* spp.
Nonvascular	*Rhytidiadelphus triquetrus*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis, Betula alleghaniensis*
Short shrub	*Cornus canadensis*
Forb	*Clintonia borealis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Thuja occidentalis, Populus tremuloides

Globally
Thuja occidentalis, Betula alleghaniensis

VEGETATION DESCRIPTION
Voyageurs National Park
This community is dominated by a canopy of *Thuja occidentalis* with lesser amounts of *Abies balsamea*. Canopy coverage is typically 80-100%. *Populus tremuloides* and/or *Populus balsamifera* can occur as an emergent strata with 30-60% cover or as part of the canopy of *Thuja occidentalis*. In stands with a dense canopy, the shrub layer is usually absent. In more open canopies, the shrub layer is present at low cover and consists of *Abies balsamea, Acer spicatum,* and/or *Corylus cornuta*. Cover of the herbaceous stratum is, likewise, dependent on canopy closure. Stands with dense canopy may virtually lack an herbaceous stratum. Even in more open stands, cover of the herbaceous layer is typically less than 40%. The most abundant species are *Rubus pubescens, Mitella nuda, Aralia nudicaulis, Lycopodium clavatum,* and *Lycopodium dendroideum*. The nonvascular strata may be absent or present at low cover. The most abundant species is *Rhytidiadelphus triquetrus*.

Globally
The canopy of this community is dominated by *Thuja occidentalis* and a variety of hardwoods, most typically *Betula alleghaniensis, Betula papyrifera*, and *Populus tremuloides*, but occasionally *Acer rubrum, Acer saccharum,* and *Fraxinus nigra*. Associated conifers include *Abies balsamea*, *Picea glauca*, and, rarely, *Tsuga canadensis*. The understory usually contains a well developed shrub/sapling layer, including *Abies balsamea*, *Acer spicatum, Corylus cornuta, Diervilla lonicera*, *Linnaea borealis*, *Ribes triste*, *Rubus pubescens*, and *Taxus canadensis.* Herbaceous species include *Aralia nudicaulis, Aster macrophyllus*, *Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Gymnocarpium dryopteris, Lycopodium* spp., *Maianthemum canadense, Mitella nuda, Onoclea sensibilis,* and *Trientalis borealis*. Moss species include *Hylocomium splendens*, *Pleurozium schreberi, Rhytidiadelphus triquestrus*, and others (Minnesota NHP 1993, Chambers *et al.* 1997). Diagnostic features include the mixed dominance of *Thuja occidentalis* and hardwoods, particularly *Betula alleghaniensis,* in an essentially upland site type.

CONSERVATION RANK G2Q. There are probably fewer than 100 occurrences of this community rangewide. It is reported from Minnesota (where it is ranked S2), Wisconsin (S?), Michigan (S?), and Ontario (S?). Currently there is only one occurrence documented from Minnesota, but stands at Voyageurs have recently been reported. Minimal data on current acreage are available; the one occurrence documented from Minnesota has 14 acres. It is likely that many stands have been degraded by logging. This community is reported from two ecoregion subsections in the western Lake Superior basin.

DATABASE CODE CEGL002450

COMMENTS
Voyageurs National Park
Most stands are closely related to the White Cedar-Boreal Conifer Forest. Though uncommon, some stands that are more well drained may be more closely related to the mesic versions of the Spruce-Fir/Mountain Maple Forest. The understory of this community can resemble that of the White Cedar-Boreal Conifer Forest. The Eastern White Cedar-Yellow Birch Forest differs in having at least 25% *Populus tremuloides* and/or *Populus balsamifera* in the canopy or emergent strata.

Given the predominance of *Populus tremuloides* in the canopy and emergent layers of this community, stands of this type in the park may represent a disturbed (post-logging) phase of the Eastern White Cedar-Yellow Birch Forest.

REFERENCES
Beals, E., and G. Cottam. 1960. The forest vegetation of the Apostle Islands, Wisconsin. Ecology 41:743-751.
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.
Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

6.9 Northern Pine-(Hardwood) Forests

Pinus banksiana - Populus tremuloides / Diervilla lonicera Forest (Jack Pine - Aspen / Bush Honeysuckle Forest)

COMMON NAME	Jack Pine - Trembling Aspen / Bush-honeysuckle Forest
SYNONYM	Jack Pine - Aspen / Bush Honeysuckle Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PINUS BANKSIANA - POPULUS TREMULOIDES FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

Type was not described at Voyageurs, as many examples are actually mosaics of Jack Pine/Balsam Fir Forest (CEGL002437) and Aspen-Birch/Boreal Conifer Forest (CEGL002466). Both of those types are widespread throughout the park.

Globally

This community is found in northern Minnesota, northwestern Ontario, and Manitoba. It may be more widespread in Canada's boreal region.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Globally

This community is found on generally level sandy outwash plains or moderately sloping moraines (Sims *et al.* 1989, MN NHP 1993). The soils are fresh to dry, deep, sandy loams, loams, and fine sands (Sims *et al.* 1989). In Manitoba, the soils tend to be somewhat more moist and fine (Zoladeski *et al.* 1995).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species

Globally

Stratum	Species
Tree canopy	*Pinus banksiana, Populus tremuloides*
Tall shrub	*Corylus cornuta*
Forb	*Aralia nudicaulis, Aster macrophyllus, Clintonia borealis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

Pinus banksiana, Populus tremuloides, Corylus cornuta

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not described at Voyageurs National Park. See the global description for some characteristics of the type.

Globally

The canopy layer is a mix of coniferous and deciduous trees, with the conifers tending to be more abundant in the

north (Sims *et al.* 1989, Zoladeski *et al.* 1995). The canopy is typically dominated by *Pinus banksiana* and *Populus tremuloides* with lesser amounts of *Abies balsamea, Betula papyrifera, Picea glauca*, and *Picea mariana*. Tree density and crown spacing may be moderately dense to dense, but sufficient light penetrates to permit the growth of a vigorous shrub layer. Most shrubs are less than 1 meter tall. The most common among these are *Corylus cornuta, Diervilla lonicera, Linnaea borealis, Rosa acicularis, Rubus pubescens*, and *Vaccinium* spp. The herbaceous layer is also typically quite rich with species such as *Aralia nudicaulis, Aster macrophyllus, Cornus canadensis, Clintonia borealis, Streptopus roseus, Trientalis borealis*, and *Viola* spp.

CONSERVATION RANK G4G5.

DATABASE CODE CEGL002518

COMMENTS

Voyageurs National Park

Type was not described at Voyageurs, as many examples are actually mosaics of Jack Pine/Balsam Fir Forest (CEGL002437) and Aspen-Birch/Boreal Conifer Forest (CEGL002466).

REFERENCES

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

Pinus banksiana / Abies balsamea Forest (Jack Pine / Balsam Fir Forest)

COMMON NAME	Jack Pine / Balsam Fir Forest
SYNONYM	Jack Pine / Balsam Fir Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.b)
ALLIANCE	PINUS BANKSIANA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This community type occurs throughout the park on well-drained, somewhat rocky upland sites.

Globally

This community is found in northeastern Minnesota and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community type occurs on flat or slightly sloping terrain with variable aspects. Soils are typically fairly well drained loams or sandy loams ranging from 5-30 cm in depth. Surficial rocks and bedrock outcrops are common. In some stands, coarse woody debris is abundant.

Globally

This community is found on moderately deep (50-100 cm), usually sandy soils (Grigal and Ohmann 1975). Surficial rocks and bedrock outcrops are common. The sites are often on north- to northeast-facing slopes.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus banksiana*
Tree sub-canopy	*Abies balsamea, Picea mariana*
Tall shrub	*Abies balsamea, Viburnum rafinesquianum, Corylus cornuta*
Short shrub	*Vaccinium angustifolium*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Nonvascular	*Pleurozium schreberi, Dicranum* spp.

Globally

Tree canopy	*Pinus banksiana*
Tall shrub	*Abies balsamea, Viburnum rafinesquianum, Corylus cornuta*
Short shrub	*Vaccinium angustifolium*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Nonvascular	*Pleurozium schreberi, Dicranum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Pinus banksiana, Abies balsamea, Viburnum rafinesquianum

Globally

Pinus banksiana, Abies balsamea

VEGETATION DESCRIPTION

Voyageurs National Park
The canopy of this community usually consists solely of *Pinus banksiana* and ranges from 60-80% cover. The sub-canopy is most often absent, but in some cases may be a 20-30% cover of *Abies balsamea, Betula papyrifera,* or *Picea mariana*. In some cases, these species may also reach the canopy. Like the sub-canopy, the tall shrub layer may be absent or present at 20-30% cover and consist of *Abies balsamea, Viburnum rafinesquianum*, and *Corylus cornuta*. A dwarf-shrub layer dominated by *Vaccinium angustifolium* is usually present at 20-40% cover but in some cases may be as low as 5%. Herbaceous cover is highly variable, ranging from 30-80%, and consists mainly of *Aster macrophyllus, Aralia nudicaulis*, and *Pteridium aquilinum,* with lesser amounts of *Cornus canadensis, Maianthemum canadensis, Lycopodium dendroideum,* and *Oryzopsis asperifolia.* The abundance of the nonvascular strata, which usually consists mainly of *Pleurozium schreberi*, is highly variable. Stands with 90% cover of *Pleurozium schreberi*, as well as stands lacking this moss, are both common.

Globally
The tree layer of this community is dominated by *Pinus banksiana*, often to the exclusion of other species. *Abies balsamea*, *Betula papyrifera*, *Picea mariana*, and *Populus tremuloides* dominate the sapling and seedling layers and sometimes occur in the canopy. There is a well developed shrub layer containing species such as *Acer spicatum*, *Amelanchier alnifolia*, *Corylus cornuta*, *Lonicera canadensis*, and *Vaccinium* spp. The herbaceous layer is dominated by dry-mesic forest species including *Aralia nudicaulis*, *Aster macropyllus*, *Clintonia borealis*, *Coptis trifolia*, and *Galium boreale*. Mosses and lichens are common on the forest floor.

CONSERVATION RANK G5.

DATABASE CODE CEGL002437

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy consisting solely of *Pinus banksiana* and canopy closure not prevented by the presence of exposed bedrock. This type is more similar to the Jack Pine Rocky Woodland than to the Jack Pine-Northern Pin Oak Forest. Some stands in the park may represent a Jack Pine/Feathermoss type similar to the Black Spruce/Feathermoss type. *Populus* spp. may rarely be found mixed in the canopy with *Pinus banksiana*. These circumstances represent the Jack Pine-Aspen/Bush Honeysuckle Forest type, which is rare in the park. More commonly, the Jack Pine/Balsam Fir Forest is found in a mosaic pattern with Aspen-Birch/Boreal Conifer Forest.

This community often originates after and may be maintained by fire.

Globally
This community often originates following fires.

REFERENCES
Grigal, D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecological Monographs. 45:389-407.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Pinus resinosa - Populus tremuloides / Diervilla lonicera - Vaccinium spp. Forest (Red Pine - Aspen - Birch Forest)

COMMON NAME	Red Pine - Trembling Aspen / Bush-honeysuckle - Blueberry species Forest
SYNONYM	Red Pine - Aspen - Birch Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PINUS STROBUS - (PINUS RESINOSA) - POPULUS TREMULOIDES FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is found throughout the park, typically as a mix or as part of a mosaic of pure red or white pine and pure aspen-birch types.

Globally

This association is found in Minnesota, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Stands are found on well-drained upland sites on a variety of landforms. Soils are coarse sandy, and shallow to deep.

Globally

Stands are found on well-drained upland sites on a variety of landforms. Soils are coarse sandy, and shallow to deep (Sims *et al.* 1989, McCarthy *et al.* 1994).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species

Globally

Stratum	Species
Tree canopy	*Pinus resinosa, Populus tremuloides*
Short shrub	*Diervilla lonicera, Vaccinium* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

Pinus resinosa, Populus tremuloides, Diervilla lonicera, Vaccinium spp.

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not described separately at Voyageurs National Park. See global description for characteristics of this type.

Globally

Stands contain a mix of deciduous and evergreen trees, comprising mainly *Pinus resinosa* as the conifer, with some *Pinus banksiana, Pinus strobus*, and *Abies balsamea*. Less frequent associates include *Picea glauca* and *Picea*

mariana. Hardwoods include *Betula papyrifera, Populus grandidentata,* and *Populus tremuloides*. The shrub and herb layer varies from dense to open. Tall and dwarf-shrubs include *Abies balsamea, Acer spicatum, Amelanchier* spp., *Corylus cornuta, Diervilla lonicera, Linnaea borealis, Lonicera canadensis, Vaccinium angustifolium*, and *Vaccinium myrtilloides*. Herbs *include Aster macrophyllus, Aralia nudicaulis, Clintonia borealis, Cornus canadensis*, and *Maianthemum canadense*. Large patches of feathermoss can develop on the forest floor. Moss species include *Dicranum polysetum* and *Pleurozium schreberi* (Sims *et al.* 1989, McCarthy *et al.* 1994).

CONSERVATION RANK G?.

DATABASE CODE CEGL002520

COMMENTS

Voyageurs National Park

The Red Pine-Aspen-Birch Forest is rarely found as a distinct type; it more commonly is found as a mosiac of the Red Pine/Blueberry Dry Forest (CEGL002443) and the Aspen-Birch/Boreal Conifer Forest (CEGL002466). Where hardwoods, especially *Populus tremuloides* and *Betula papyrifera*, are present in the canopy with *Pinus resinosa* at > 25% cover, stands belong with this type, the Red Pine-Aspen-Birch Forest.

REFERENCES

Pinus resinosa / Vaccinium spp. Forest (Red Pine / Blueberry Dry Forest)

COMMON NAME	Red Pine / Blueberry species Forest
SYNONYM	Red Pine / Blueberry Dry Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.b)
ALLIANCE	PINUS RESINOSA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is found througout the park on dry, rocky sites with gentle to moderate (5-20%) slopes and variable aspects.

Globally

This community is found in northern Michigan, northern Wisconsin, northern Minnesota, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Though occurring occasionally on flat terrain, the Red Pine/Blueberry Dry Forest more often occurs on gentle to moderate (5-20%) slopes with variable aspects. The substrate is typically dry to dry-mesic and very rocky. Soils are loams or sandy loams and range from 3-20 cm in depth underlain by bedrock or coarse loose rock. Typical soil development includes 1-3 cm "O" layer composed of undecomposed needle duff, 3-5 cm "A" sandy loam, 5+ cm "B" sandy loam. A low chroma "E" horizon 3-5 cm thick below the "A" horizon may or may not be present. The duff layer composed of pine needles commonly cover 60-90% of the forest floor. Smaller stands of this type typically exist on small islands within the park.

Globally

This community occurs on a variety of substrates, but typically has sandy upper horizons. Sites may be on bedrock, overlaid with shallow to medium deep (> 60 cm), coarse sand or coarse loam soils. Moisture varies from dry to dry-mesic, and stands are on mid to upper gentle slopes. The climate is highly variable, with temperature extremes between -46 C and 38 C, and anywhere from 58-91 cm of precipitation.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus resinosa, Pinus strobus*
Tall shrub	*Abies balsamea, Corylus cornuta, Acer rubrum*
Short shrub	*Vaccinium angustifolium, Vaccinium myrtilloides, Pinus strobus, Amelanchier* spp.
Forb	*Maianthemum canadense, Aster macrophyllus*
Fern	*Pteridium aquilinum, Polypodium virginianum*
Graminoid	*Oryzopsis asperifolia*
Nonvascular	*Pleurozium schreberi, Dicranum polysetum, Dicranum scoparium, Dicranum ontariense*

Globally

Tree canopy	*Pinus resinosa*
Tall shrub	*Corylus cornuta*
Short shrub	*Vaccinium angustifolium, Vaccinium myrtilloides*
Nonvascular	*Pleurozium schreberi*

CHARACTERISTIC SPECIES
Voyageurs National Park
Pinus resinosa, Vaccinium angustifolium

Globally
Corylus cornuta, Pinus resinosa, Vaccinium angustifolium, Vaccinium myrtilloides

VEGETATION DESCRIPTION
Voyageurs National Park
Canopy coverage in the Red Pine/Blueberry Dry Forest is typically 70-90% and can consist either solely of *Pinus resinosa* or of a mixture of *Pinus resinosa* and *Pinus strobus.* *Pinus resinosa* is often the only conifer in the canopy on sites with rockier, more shallow soils. On dry-mesic sites, however, *Pinus strobus* can comprise up to 60% of the canopy. *Populus tremuloides* and *Betula papyrifera* may also exist in the canopy at <25% relative cover. Canopy height is 10-15 meters in younger stands and up to 20-35 meters in more mature stands. In stands with more complete canopy cover, understory vegetation can be sparse. A shrub layer, if present, comprises low (20%) cover and consists of *Abies balsamea, Corylus cornuta, Acer rubrum, Pinus strobus*, and *Amelanchier* spp. *Vaccinium angustifolium* and *Vaccinium myrtilloides* are common dwarf-shrubs, but rarely reach greater than 40% cover. In more open stands with exposed bedrock, *Juniperus communis* may dominate the dwarf-shrub strata with 20-30% cover. Presence of herbaceous species is highly variable ranging from virtually absent to 90% cover. Younger stands with closed canopies typically contain less herbaceous cover than more mature stands. In both cases, the herbaceous class is relatively species poor. The most abundant species are: *Maianthemum canadense, Aster macrophyllus, Pteridium aquilinum, Oryzopsis asperifolia*, and *Polypodium virginianum*. Though the cover of moss can occasionally reach 70-80%, 10-20% is more common. Important moss species include *Pleurozium schreberi, Dicranum polysetum, Dicranum scoparium,* and *Dicranum ontariense*.

Globally
This community is characterized by a pine overstory and a poorly developed understory. *Pinus resinosa* is present in the canopy at a higher cover and basal area than other conifers (typically 80% or more). *Pinus strobus* can be common in the canopy. Mesic sites tend to include *Pinus resinosa*, *Picea mariana, Picea glauca*, and *Abies balsamea* in the canopy, whereas on dry sites, *Pinus resinosa* and *Pinus banksiana* are found (MN NHP 1993). Beneath the canopy, northern hardwoods, such as *Acer rubrum* and *Betula papyrifera*, sometimes form a subcanopy. The understory ranges from moderately herb and shrub rich to extremely poor. In the tall shrub class, the important species are *Amelanchier* spp. and *Corylus cornuta*. The short shrub layer includes *Gaultheria procumbens, Linnaea borealis, Vaccinium angustifolium*, and *Vaccinium myrtilloides*, particularly where gaps in the canopy occur (Ohmann and Ream 1971). The herb layer is very poorly represented in most parts of this community's range and includes *Aralia nudicaulis, Aster macrophyllus, Cornus canadensis, Maianthemum canadense, Pteridium aquilinum*, and *Trientalis borealis*. Mosses can have very high cover, and typically include *Dicranum* spp. (e.g., *Dicranum polysetum, Dicranum scoparium*) and *Pleurozium schreberi*. The average coverage of feathermoss was greater in the northwest region of Ontario than in the northcentral region (Sims *et al.* 1989).

CONSERVATION RANK G3. There are probably over 100 occurrences of this community rangewide. Currently there are 77 occurrences documented from Michigan (where it is ranked S3), Minnesota (S3), and Wisconsin (S3); it is also reported from Manitoba (S3) and Ontario (S?). There are probably over 10,000 acres of this community rangewide. Currently 5545 acres have been documented from 45 occurrences in Michigan, Minnesota, and Wisconsin. Some sites have been degraded by logging, but there are also many mature to old-growth stands remaining.

DATABASE CODE CEGL002443

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy of *Pinus resinosa* with less than 40% *Pinus strobus* in the canopy. The Red Pine/Blueberry Dry Forest is very similar to the Red Pine-Aspen-Birch Forest and can be distinguished only by the differences in canopy dominants. On dry-mesic sites, the Red Pine/Blueberry Dry Forest can grade into the White Pine/Mountain Maple Mesic Forest where *Pinus strobus* in the canopy reaches > 60% cover. Where hardwoods (especially *Populus tremuloides* and *Betula papyrifera*) are also present in the canopy at > 25% cover, this type grades into the Red Pine-Aspen-Birch Forest. The Red Pine-Aspen-Birch Forest is rarely found as a distinct type; it more commonly is found as a mosiac of the Red Pine/Blueberry Dry Forest and the Aspen-Birch-Boreal Conifer Forest.

See comments on fire in Global description.

Globally
Sims *et al.* (1989) found that in the Quetico region of northwest Ontario, a rich understory of *Acer spicatum, Corylus cornuta, Alnus crispa, Diervilla lonicera,* and *Aralia nudicaulis* was established. Further north and west, however the understory was open, and dominated by low ericaceous species.

Fire is an important natural disturbance in this community. *Pinus resinosa* has adaptations that make it well suited to frequent ground fires and occasional crown fires. Reconstructions of the fire regime (Heinselman 1973, Frelich 1992) in red and white pine stands indicate that a combination of ground fires every 20 to 30 years, and severe crown fires every 100-150 years maintained presettlement *Pinus resinosa* communities. The thick, corky bark of older *Pinus resinosa* stems make them more resistant to fire than any other type of pine. These older stems are more likely to survive than those of *Pinus strobus* or *Pinus banksiana* when no crown damage results (Ahlgren 1974). In addition *Pinus resinosa* seedling establishment is favored by exposed mineral soils and high sunlight. Therefore relatively frequent fires make the continued regeneration of *Pinus resinosa* possible, as they are only moderately shade tolerant. Fire suppression over much of its range appears to be leading towards the gradual succession from *Pinus resinosa* forests to forests of mesic hardwoods or *Pinus strobus*, which under a frequent fire regime are confined to the understory (MN NHP 1993).

REFERENCES

Ahlgren, C. E. 1974. Effects of fires on temperate forests: north central United States. In: Fire and ecosystems. Kozlowski, T. T., and C. E. Ahlgren, eds. Academic Press, New York. 542 pp.

Frelich, Lee. 1992. The relationship of natural disturbances to white pine stand development. Presented at the White Pine Symposium: History, Ecology, Policy and Management, Duluth, MN, September 16-18, 1992.

Heinselman, M. L. 1973. Fire in the virgin forests of the Boundary Waters Canoe Area, Minnesota. Quat. Res. 3:329-382.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F., and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Pinus strobus - Populus tremuloides / Corylus cornuta Forest (White Pine - Aspen - Birch Forest)

COMMON NAME	White Pine - Trembling Aspen / Beaked Hazelnut Forest
SYNONYM	White Pine - Aspen - Birch Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PINUS STROBUS - (PINUS RESINOSA) - POPULUS TREMULOIDES FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is found throughout the park, typically as part of a mix or as a mosaic of pure red or white pine and pure aspen-birch types.

Globally

This association is found in Michigan, Minnesota, Wisconsin, and probably Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Stands are found on a variety of slope positions on shallow to deep (> 60 cm), dry-mesic to mesic, rapidly drained soils.

Globally

Stands are found on a variety of slope positions on shallow to deep (> 60 cm), dry-mesic to mesic, rapidly drained soils, with fine sandy to loamy soil textures (Sims *et al.* 1989, Minnesota DNR 1993, Chambers *et al.* 1997).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus strobus, Betula papyrifera, Populus tremuloides*

Globally

Stratum	Species
Tree canopy	*Pinus strobus, Betula papyrifera, Populus tremuloides*

CHARACTERISTIC SPECIES

Voyageurs National Park

Pinus strobus, Betula papyrifera, Populus tremuloides

Globally

Pinus strobus, Betula papyrifera, Populus tremuloides

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not described separately at Voyageurs National Park. See global description for characteristics of this type.

Globally

The tree canopy is mixed evergreen-deciduous. *Pinus strobus* may form a supercanopy over a mixture of other species, including *Betula papyrifera, Populus tremuloides, Picea glauca*, and *Abies balsamea*. Less frequent are *Pinus resinosa, Populus grandidentata,* and *Thuja occidentalis*. The subcanopy can include *Acer rubrum* and *Acer saccharum*, as well as a mixture of canopy species. Tall shrubs and saplings include *Abies balsamea, Acer*

spicatum, Amelanchier spp., and *Corylus cornuta*. Short shrubs include *Diervilla lonicera, Linnaea borealis, Lonicera canadensis*, and *Vaccinium myrtilloides. Viburnum cassinoides* may be present in the eastern part of the range. Herbs include *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Cornus canadensis, Maianthemum canadense, Oryzopsis asperifolia, Pteridium aquilinum, Streptopus roseus*, and *Trientalis borealis*. Typical mosses include *Pleurozium schreberi, Dicranum polysetum* and *Dicranum flagellare* (Sims *et al.* 1989, Minnesota DNR 1993, Chambers *et al.* 1997).

CONSERVATION RANK G4?.

DATABASE CODE CEGL002479

COMMENTS

Voyageurs National Park

The White Pine-Aspen-Birch Forest is rarely found as a distinct type; it more commonly is found as a mosiac of the White Pine/Mountain Maple Mesic Forest (CEGL002445) and the Aspen-Birch/Boreal Conifer Forest (CEGL002466). Where hardwoods, particularly *Populus tremuloides* and *Betula papyrifera*, are present in the canopy with *Pinus strobus* at > 25% cover, stands are classified as the White Pine-Aspen-Birch Forest.

Globally

This community may arise as a successional stage after fire, but may also originate after logging.

REFERENCES

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Pinus strobus / Acer spicatum - Corylus cornuta Forest (White Pine / Mountain Maple Mesic Forest)

COMMON NAME	White Pine / Mountain Maple - Beaked Hazelnut Forest
SYNONYM	White Pine / Mountain Maple Mesic Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.b)
ALLIANCE	PINUS STROBUS FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This community occurs on dry mesic sites throughout the park.

Globally

This community is found in Ontario, northern Wisconsin, northern Michigan, and northern Minnesota.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The White Pine/Mountain Maple Mesic Forest generally occurs on gentle slopes with variable aspects. Surficial rocks and small patches of exposed bedrock are occasionally present. Soils are somewhat shallow (3-10 cm deep) loams or sandy loams. A duff layer of pine needles is common. These sites are well to moderately well drained.

Globally

This community is found on Precambrian Shield bedrock that is overlaid with sandy loam soils, which are moderately well-drained and shallow to deep (> 60 cm). In northeastern Minnesota stands occur on northeast and south facing slopes that are moderate to steep, with slopes ranging from 4 to 45% (Ohmann and Ream 1971). The climate is highly variable, with temperature extremes between -46 C and 38 C and 58-91 cm precipitation.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Pinus strobus, Pinus resinosa*
Tall shrub	*Abies balsamea, Corylus cornuta, Acer rubrum, Amelanchier* spp.
Short shrub	*Vaccinium angustifolium, Vaccinium myrtilloides*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*
Nonvascular	*Pleurozium schreberi, Dicranum* spp.

Globally

Emergent tree	*Pinus strobus*
Tree canopy	*Pinus strobus*, *Abies balsamea*
Tall shrub	*Acer spicatum, Corylus cornuta, Diervilla lonicera*
Short shrub	*Vaccinium angustifolium, Vaccinium myrtilloides*
Forb	*Aster macrophyllus*
Nonvascular	*Pleurozium schreberi, Dicranum* spp.

CHARACTERISTIC SPECIES

Voyageurs National Park

Pinus strobus, Abies balsamea, Corylus cornuta, Amelanchier spp.*, Vaccinium angustifolium*

Globally

Abies balsamea, Aster macrophyllus, Diervilla lonicera, Pinus strobus

VEGETATION DESCRIPTION

Voyageurs National Park

The canopy of the White Pine/Mountain Maple Mesic Forest commonly consists of a mix of *Pinus strobus* and *Pinus resinosa*, with *Pinus strobus* comprising at least 40% of the relative cover. Total canopy cover is 60-90% with canopy tree height typically 15-20 meters. A shrub layer composed of *Abies balsamea, Corylus cornuta, Acer rubrum*, and/or *Amelanchier* spp. is usually present with 20-50% cover. The dwarf blueberries, *Vaccinium angustifolium* and *Vaccinium myrtilloides* may also be present at low cover. The herbaceous strata is typically sparse with low to moderate cover and low species diversity. The most common species are *Aster macrophyllus, Pteridium aquilinum, Aralia nudicaulis, Maianthemum canadense*, and *Oryzopsis asperifolia*. The cover of mosses is highly variable ranging from nearly absent to 90%. The most common species are *Pleurozium schreberi, Dicranum scoparium, Dicranum polysetum,* and *Dicranum ontariense*.

Globally

This community is dominated by *Pinus strobus*. It is often distinguished by a supercanopy of large, old *Pinus strobus* and scattered *Pinus resinosa*. The lower layer of the canopy consists mainly of *Abies balsamea* trees and saplings (Ohmann and Ream 1971). Other trees that may be found in this layer include *Betula alleghaniensis*, *Picea glauca*, *Thuja occidentalis*, *Acer rubrum*, *Acer spicatum*, and other trees common to boreal forest landscapes. The tall shrub layer is moderately to well developed and consists of *Abies balsamea, Acer spicatum, Corylus cornuta*, and, less frequently, *Amelanchier* spp. (Ohmann and Ream 1971, Sims *et al.* 1989). The low shrub layer is not well developed. Characteristic species include *Diervilla lonicera, Linnaea borealis, Vaccinium myrtilloides,* and *Vaccinium angustifolium*. The herb stratum is also not well developed. The deep layer of undecomposed needles that formed the mor humus are not conducive to herb growth (Martin 1959). Prevalent herbs include *Aralia nudicaulis, Aster macrophyllus, Cornus canadensis, Maianthemum canadense*, *Polypodium vulgare*, and *Pteridium aquilinum*. Moss species include *Dicranum polysetum* and *Pleurozium schreberi*.

CONSERVATION RANK G3G4. There are fewer than 100 occurrences of this community rangewide, but Ontario ranks are unknown. Currently there are 45 occurrences documented from Minnesota (where it is ranked S3), Michigan (S?), and Wisconsin (S?); it is also reported from Ontario (S?). There are probably fewer than 10,000 acres of this community rangewide. Currently 2075 acres have been documented from 32 occurrences in Minnesota, Michigan, and Wisconsin. Many stands are reported to be of post-fire origin; infrequent catastrophic fires may be important for maintenance of this community. Some sites have been degraded by logging. Some sites may be disturbed by fire suppression, and they may be succeeding to other forest types.

DATABASE CODE CEGL002445

COMMENTS

Voyageurs National Park

Diagnostic features of the type are forest canopy consisting of greater than 40% *Pinus strobus*. May not be distinct from the White Pine-Aspen-Birch Forest. Both the White Pine/Mountain Maple Mesic Forest and the Red Pine/Blueberry Dry Forest may contain *Pinus strobus* and *Pinus resinosa* in the canopy. The White Pine/Mountain Maple Mesic Forest, however, may contain up to 60% *Pinus resinosa*. This community also generally occupies more mesic sites than the Red Pine/Blueberry Dry Forest. Where hardwoods (especially *Populus tremuloides* and *Betula papyrifera*) are also present in the canopy at > 25% cover, this type grades into the White Pine-Aspen-Birch Forest. The White Pine-Aspen-Birch Forest is rarely found as a distinct type, it more commonly is found as a mosiac of the White Pine/Mountain Maple Mesic Forest and the Aspen-Birch-Boreal Conifer Forest.

Globally

There appear to be two variants of this community. Both are dominated by a supercanopy of white pines. In the first variant of this in northeastern Minnesota and northwestern Ontario, the understory is dominated by *Abies balsamea*, and, with no fire regime, the forest appears to succeed to a fir-(birch?) forest (Ohmann and Ream 1970). This type of stand was also found in northeastern Ontario by Martin (1959), in a 25 acre stand estimated to be 100 years old. There were also a few spindly *Betula papyrifera* trees in the understory. A second variant may be a late successional stage white pine forest, thought to be 300 years old in the same region, where the understory was dominated by *Betula lutea* and *Tsuga canadensis*. All of the *Abies balsamea* over 5 cm d.b.h. were dead, although there were many smaller *A. balsamea.*

Fire is an important natural disturbance in this community. Although *Pinus strobus* does not have the more

sophisticated adaptations to fire that *Pinus resinosa* and *Pinus banksiana* do, *Pinus strobus* seedling establishment is favored by post-fire conditions, such as exposed mineral soil and high sunlight. Once established, mature *Pinus strobus* are able to survive surface fires and have moderate tolerance to shade. Frelich (1992), in an overview of research done on various *Pinus strobus* communities, found that white pine is most abundant in forests with a catastrophic fire rotation period of 150-300 years. This coincides with the fire rotation cycle found in the BWCA in northeastern Minnesota, where Heinselman found that *Pinus strobus* stands remained largely intact for 150-350 years.

Fire plays an important part in the longevity of the stand. Where there are frequent ground fires, understory shrubs and herbs are reduced, and the exposed mineral soil is favorable for pine regeneration (Ohmann and Ream 1971). Ohmann and Ream (1971) also suggested that fire suppression in the BWCA had allowed an extremely well-developed *Abies balsamea* undercanopy to become established, thus hastening the successional trend towards an *Abies balsamea* forest.

REFERENCES

Frelich, Lee. 1992. The relationship of natural disturbances to white pine stand development. Presented at the White Pine Symposium: History, Ecology, Policy and Management, Duluth, MN, September 16-18, 1992.

Grigal, D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecological Monographs. 45:389-407.

Heinselman, M. L. 1973. Fire in the virgin forests of the Boundary Waters Canoe Area, Minnesota. Quat. Res. 3:329-382.

Martin, N.D. 1959. An analysis of forest succession in Algonquin Park, Ontario. Ecol. Monographs. 29(3):187-218.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F., and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

6.10 Northern Spruce-Fir-(Hardwood) Forests

Abies balsamea - Betula papyrifera / Diervilla lonicera Forest (Balsam Fir - Paper Birch Forest)

COMMON NAME	Balsam Fir - Paper Birch / Bush-honeysuckle Forest
SYNONYM	Balsam Fir - Paper Birch Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	PICEA GLAUCA - ABIES BALSAMEA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park1

This type was not tracked separately at Voyageurs, so its range is not clear.

Globally

This community is found in northern Minnesota, northwestern Ontario, and southeastern Manitoba.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Globally

This community is found on deep, moist to mesic, mineral soils, usually loams (Sims *et al.* 1989). It can be on flat to moderate slopes (5-30%) and, in northern Minnesota, tends to be near water (Ohmann and Ream 1971).

MOST ABUNDANT SPECIES

Voyageurs National Park

Globally

Stratum	Species
Tree canopy	*Abies balsamea, Betula papyrifera*

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

Abies balsamea, Betula papyrifera

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not described separately at Voyageurs National Park.

Globally

Canopy is either pure evergreen or mixed evergreen-deciduous. The overstory is usually dominated by *Abies balsamea* and *Betula papyrifera* but some stands may have large amounts of *Populus tremuloides*. Other common trees include *Picea glauca, Picea mariana, Pinus strobus*, and *Thuja occidentalis*. Canopy trees may typically be 15-25 m tall (Hansen *et al.* 1973). *Abies balsamea* is also abundant in the sapling/shrub stratum, along with *Acer spicatum, Betula papyrifera, Diervilla lonicera, Corylus cornuta, Linnaea borealis, Rubus pubescens, Sorbus americana*, and *Taxus canadensis* (especially on Isle Royale and in northern Wisconsin). Herbaceous species found in this community include *Anemone quinquefolia, Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Coptis trifolia, Cornus canadensis, Maianthemum canadense*, *Mitella nuda, Streptopus roseus*, and *Trientalis borealis*.

Mosses include *Hylocomium splendens, Plagiomnium cuspidatum, Pleurozium schreberi*, and *Ptilium crista-castrensis* (Sims *et al.* 1989).

CONSERVATION RANK G5.

DATABASE CODE CEGL002474

COMMENTS

Voyageurs National Park

This evergreen type was not described separately at Voyageurs National Park. See global description for the Fir-birch type (CEGL002474). Stands are typically mapped as part of the Spruce-Fir/Mountain Maple type (CEGL002446) or the Spruce-Fir-Aspen type (CEGL002475).

Globally

Diervilla lonicera may not be abundant in all stands. Hansen *et al.* (1973) found very little on their stands on Isle Royale in Lake Superior.

Stands may often have high tree mortality of *Abies balsamea* because of spruce budworm outbreaks. These stands are described by Ohmann and Ream (1971) as a separate "budworm-disturbed" type, but Grigal and Ohmann (1975) found that floristically these stands belong with the "Fir-birch" type.

REFERENCES

Grigal, D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecol. Monogr. 45:389-407.

Hansen, H. L., L. W. Krefting, and V. Kurmis. 1974. The forest of Isle Royale in relation to fire history and wildlife. University of Minnesota, Agricultural Exper. Station, Tech. Bull. 294, Forestry Series 13.

Ohmann, L. F. and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U.S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea mariana - Populus tremuloides / Mixed Herbs Forest (Black Spruce - Aspen Forest)

COMMON NAME	Black Spruce - Trembling Aspen / Mixed Herbs Forest
SYNONYM	Black Spruce - Aspen Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PICEA MARIANA - POPULUS TREMULOIDES FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is uncommon and localized at Voyaguers National Park, and stands were not identified for description.

Globally

This community is found in northern Minnesota, northwestern Ontario, and Manitoba, but may occur elsewhere in Canada's boreal region.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Globally

This community is found on flat to gently sloping sites with fresh to moist mineral soils (Sims *et al.* 1989, Zoladeski *et al.* 1995). Soil texture is most often coarse loam, but can be clay, silt, or sand. Fine textured soils tend to be on lacustrine substrates while coarse textured soils result from morainal or glaciofluvial substrates. In Ontario, this community often occurs on calcareous soil (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species

Globally

Stratum	Species
Tree canopy	*Picea mariana, Populus tremuloides*
Short shrub	*Linnaea borealis, Abies balsamea, Rubus pubescens, Vaccinium angustifolium*, *Vaccinium myrtilloides*.

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

Picea mariana, Populus tremuloides, Linnaea borealis, Abies balsamea, Rubus pubescens, Vaccinium angustifolium, *Vaccinium myrtilloides*.

VEGETATION DESCRIPTION

Voyageurs National Park

Not described at Voyageurs National Park. See description for Spruce-Fir-Aspen type (CEGL002475).

Globally

The tree layer is dominated by a moderately closed to closed canopy of mixed coniferous and deciduous species. *Populus tremuloides* is the only common deciduous tree, but scattered *Betula papyrifera* and *Populus balsamifera* are also found. *Picea mariana* is the most abundant coniferous species, and often the most abundant canopy species. *Abies balsamea, Picea glauca*, and *Pinus banksiana* are typical associated conifers. The shrub layer ranges from

open to dense. Species found in this layer include *Diervilla lonicera*, *Ledum groenlandicum, Linnaea borealis, Rosa acicularis, Rubus pubescens, Vaccinium angustifolium*, and *Vaccinium myrtilloides*. The herbaceous layer has great diversity. *Aralia nudicaulis, Aster macrophyllus, Cornus canadensis, Coptis trifolia, Maianthemum canadense, Petasites frigidus, Trientalis borealis*, and *Viola renifolia* are common herbaceous species. Mosses also cover a substantial portion of the forest floor.

CONSERVATION RANK G4G5.

DATABASE CODE CEGL002516

COMMENTS

Voyageurs National Park

This type was not described separately at Voyageurs National Park. See global description for this type under CEGL002516. Stands were mapped under the Spruce-Fir-Aspen Forest alliance, where the common type was the Spruce-Fir-Aspen Forest (CEGL002475).

Many of the *Abies balsamea* trees and shrubs in these communities are dying from Spruce Budworm infestations. In stands that border beaver ponds, selective beaver cutting of aspen and birch may occur.

REFERENCES

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

Picea mariana / Pleurozium schreberi Forest (Black Spruce / Feathermoss Forest)

COMMON NAME	Black Spruce / Feathermoss Forest
SYNONYM	Black Spruce / Feathermoss Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	PICEA MARIANA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is relatively restricted in the park, commonly occurring on moist, north-facing slopes.

Globally

This community is found in northeastern Minnesota, northwestern Ontario, and southeastern Manitoba. It may be found in other parts of Manitoba.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

The Black Spruce/Feathermoss community occurs on flat to very steep (35% slope) terrain often with a northerly aspect. It can also occur on ridge tops where shallow soils have developed down slope from open bedrock. The terrain is usually very rocky, the rocks often covered by feathermoss. Patches of exposed bedrock are common. The soils are shallow sandy or silt loams averaging 2-10 cm deep over bedrock or loose rock. An undecomposed "O" horizon 2-5 cm thick is nearly always present and in shallow soils may constitute the only soil. In more well developed soils, "A", "B" and "E" horizons may also be present with varying degrees of thickness.

Globally

This community is found on level to gently sloping ground. Soils are typically moderately well drained, coarse loams, sands, and silts (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Picea mariana*
Tree sub-canopy	*Abies balsamea*
Tall shrub	*Picea mariana, Abies balsamea*
Short shrub	*Vaccinium angustifolium*
Forb	*Aster macrophyllus, Cornus canadensis, Clintonia borealis*
Fern	*Lycopodium* spp.
Nonvascular	*Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Picea mariana*
Nonvascular	*Pleurozium schreberi*

CHARACTERISTIC SPECIES

Voyageurs National Park

Picea mariana, Pleurozium schreberi

Globally

Picea mariana, Pleurozium schreberi

VEGETATION DESCRIPTION

Voyageurs National Park

Canopy cover of *Picea mariana* in this community ranges from 40-100% but is commonly in the 80-90% range. *Betula papyrifera* and *Populus tremuloides* can also occur in the canopy at low cover. The sub-canopy is non-existent or consists of a low cover of *Abies balsamea*. Shrub layers are typically absent or present with low cover and consist of *Picea mariana* and *Abies balsamea*. In the stands that have a more open canopy, the herbaceous strata can reach 80% and is dominated by *Aster macrophyllus, Lycopodium clavatum, Lycopodium dendroideum, Cornus canadensis, Clintonia borealis*, and *Maianthemum canadense*. In the stands with a more closed canopy, the herbaceous strata can be as low as 5%. The dwarf-shrub *Vaccinium angustifolium* may be absent or present up to 20% cover. Feathermoss, mainly *Pleurozium schreberi*, usually covers 80-100% of the forest floor, though in closed canopy situations may be virtually absent.

Globally

The canopy of this community is closed and strongly dominated by *Picea mariana* with small amounts of *Abies balsamea*, *Betula papyrifera*, *Picea glauca*, *Pinus banksiana*, and *Populus tremuloides*. The shrub and herb layer are poorly developed (Grigal and Ohmann 1975). Species that are most abundant in these layers include the shrubs *Corylus cornuta*, *Gaultheria procumbens*, *Ledum groenlandicum*, *Rosa acicularis*, *Vaccinium angustifolium*, and *Vaccinium myrtilloides*, and the herbs *Aster macrophyllus*, *Cornus canadensis*, *Equisetum arvense*, and *Maianthemum canadense*. Feathermosses, particularly *Pleurozium schreberi*, are very abundant. Mosses may cover from 23 % (Grigal and Ohmann 1975) to over 85% (Sims *et al.* 1989) of the forest floor.

CONSERVATION RANK G5.

DATABASE CODE CEGL002447

COMMENTS

Voyageurs National Park

Diagnostic features of the type include the *Picea mariana* canopy with *Pleurozium schreberi, Ptilium crista-castrensis,* and *Hylocomnium splendens* feathermosses. Sphagnum moss is generally absent, but may be present on lower slopes adjacent to swamps, where this community can occur mixed with the Black Spruce/Labrador Tea Poor Swamp. When *Populus* spp. becomes more dominant in the canopy, this type can grade into the Black Spruce-Aspen Forest. *Pinus banksiana* can occur mixed in the canopy.

REFERENCES

Grigal, D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecological Monographs. 45:389-407.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea glauca - Abies balsamea - Populus tremuloides / Mixed Herbs Forest (Spruce - Fir - Aspen Forest)

COMMON NAME	White Spruce - Balsam Fir - Trembling Aspen / Mixed Herbs Forest
SYNONYM	Spruce - Fir - Aspen Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PICEA GLAUCA - ABIES BALSAMEA - POPULUS SPP. FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is common throughout the park.

Globally

This community is found in northern Michigan, northern Wisconsin, northern Minnesota, northwestern Ontario, and southeastern Manitoba.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community almost always occurs on gentle slopes (0 - 10%) with variable aspects. Bedrock and coarse surficial rocks are common. A large amount of coarse woody debris is common. Soils are usually rocky, shallow sandy loams or silt loams. Typical depth is 5-8 cm though there may be areas with soils up to 20- 30 cm deep.

Globally

This upland community is found on deep, well drained to rapidly drained, moist, fine-textured, mineral soils. Loams are the most common, but silts and clays are not rare (Sims *et al.* 1989, Zoladeski *et al.* 1995).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Picea glauca, Abies balsamea, Populus tremuloides, Betula papyrifera*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*

Globally

Stratum	Species
Tree canopy	*Picea glauca, Populus tremuloides, Betula papyrifera*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Picea glauca, Abies balsamea, Populus tremuloides, Betula papyrifera, Diervilla lonicera, Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Cornus canadensis, Calamagrostis canadensis

Globally

Picea glauca, Abies balsamea, Populus tremuloides, Betula papyrifera, Diervilla lonicera, Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Cornus canadensis, Calamagrostis canadensis

VEGETATION DESCRIPTION

Voyageurs National Park

The canopy in this type is a dominated by a mix of *Populus tremuloides, Betula papyrifera, Picea glauca,* and *Abies*

balsamea. Both the deciduous and evergreen components comprise at least 25% of the canopy. Though much variation exists, there tends to be a ratio of 60:40 deciduous : evergreen trees in the canopy. Canopy cover in this community is usually 70-90% with canopy trees ranging from 10-20 m tall. The subcanopy is usually absent, but if present consists of a low (20%) cover of *Abies balsamea* or *Acer rubrum*. This community characteristically contains large gaps in the canopy allowing for a significant shrub layers. Though these layers can reach 90%, they most commonly are in the 40-70% cover range and consist of *Abies balsamea, Acer rubrum,* and *Corylus cornuta.* The short shrubs *Vaccinium angustifolium* and *Vaccinium myrtilloides* can be absent or present with less than 20% cover. There is generally a fairly low species diversity in the herbaceous strata and cover is typically from 70-80% but can be as low as 30%. The most abundant species are *Pteridium aquilinum, Aster macrophyllus, Aralia nudicaulis,* and *Cornus canadensis.*

Globally
The canopy in this type is a dominated by a mix of *Populus tremuloides, Betula papyrifera, Picea glauca,* and *Abies balsamea.* Both the deciduous and evergreen components comprise at least 25% of the canopy. Canopy cover in this community is usually 70-90% with canopy trees ranging from 10-20 m tall. The overstory composition is varied. The most abundant tree species typically *are Abies balsamea, Acer rubrum, Picea glauca, Pinus strobus, Populus tremuloides*, and *Populus balsamifera*. The subcanopy is usually absent, but if present consists of a low (20%) cover of *Abies balsamea*. The sapling/shrub layer is usually moderately well developed. *Acer spicatum, Corylus cornuta, Rosa acicularis, Rubus pubescens*, and saplings of *Abies balsamea* are the most commonly encountered in this stratum. Herb diversity is usually high. *Aralia nudicaulis, Aster ciliolatus, Aster macrophyllus, Clintonia borealis, Cornus canadensis, Galium triflorum, Maianthemum canadense, Mitella nuda*, and *Trientalis borealis* are typical of this community.

CONSERVATION RANK G5.

DATABASE CODE CEGL002475

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the mixed canopy of *Populus tremuloides, Betula papyrifera, Picea glauca*, and *Abies balsamea.* Both evergreen and deciduous components comprising at least 25% relative cover. When canopy cover of the evergreen component of this type falls to near 25%, this type can grade into the Aspen-Birch-Boreal Conifer Forest. In stands where the dominant evergreen is *Picea mariana*, the stand is considered a Black Spruce-Aspen Forest (CEGL002516), but that type is rare in the park. In stands that border beaver ponds, selective beaver cutting of aspen and birch trees may cause these types to shift to Spruce-Fir/Mountain Maple Forests (CEGL002446) or Boreal Hazelnut-Serviceberry Rocky Shrubland (CEGL005197).

Many of the *Abies balsamea* trees and shrubs in these communities are dying from Spruce Budworm infestations.

REFERENCES
Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

Picea glauca - Abies balsamea / Acer spicatum / Rubus pubescens Forest (Spruce - Fir / Mountain Maple Forest)

COMMON NAME	White Spruce - Balsam Fir / Mountain Maple / Dwarf Blackberry Forest
SYNONYM	Spruce - Fir / Mountain Maple Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	PICEA GLAUCA - ABIES BALSAMEA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type most commonly occurs on gentle to moderate slopes above wetlands and lake shores throughout the park.

Globally

This community is found in northern Michigan, northern Wisconsin, northern Minnesota, northwestern Ontario, and Manitoba. It may be found elsewhere in Canada.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type most commonly occurs on gentle to moderate slopes above beaver ponds and lake shores. Aspects are variable. Coarse woody debris is often abundant. Soils are generally rocky, 3-15 cm deep sandy loams. These sites are well to moderately well drained.

Globally

This community is found primarily on dry-mesic to mesic sites with well-drained, deep (>60 cm) loamy, sandy, or silty soils (Sims *et al.* 1989, Zoladeski *et al.* 1995). Less commonly, it may be found on wetter sites that may approach seasonally saturated conditions (Maycock 1961). The soils have little organic content and the topography is flat to gently sloping.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Picea glauca, Abies balsamea*
Tall shrub	*Abies balsamea, Corylus cornuta, Populus tremuloides*
Short shrub	*Vaccinium angustifolium*
Forb	*Aster macrophyllus, Aralia nudicaulis, Cornus canadensis*
Fern	*Pteridium aquilinum*
Nonvascular	*Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Picea glauca, Abies balsamea*
Tall shrub	*Abies balsamea, Corylus cornuta, Populus tremuloides*
Short shrub	*Vaccinium angustifolium*
Forb	*Aster macrophyllus, Aralia nudicaulis, Cornus canadensis*
Fern	*Pteridium aquilinum*
Nonvascular	*Pleurozium schreberi*

CHARACTERISTIC SPECIES

Voyageurs National Park

Picea glauca, Abies balsamea, Corylus cornuta, Aster macrophyllus

Globally
Picea glauca, Abies balsamea, Acer spicatum, Rubus pubescens

VEGETATION DESCRIPTION
Voyageurs National Park
The canopy of this community is typically fairly open (40-70%) and composed predominantly of *Picea glauca* and *Abies balsamea* with lesser amounts of *Picea mariana* occasionally present. Deciduous trees, especially *Betula papyrifera* and *Populus tremuloides* may be present in the canopy with less than 25% relative cover. A shrub layer of *Abies balsamea, Corylus cornuta,* and/or *Populus tremuloides* is almost always present. Cover of the shrub layer is highly variable and inversely proportional to canopy cover. A dwarf-shrub layer of *Vaccinium angustifolium* may be absent or present at low cover. Like the shrub strata, density of the herbaceous layer is highly variable, ranging from 10-80%. The most abundant species are *Aster macrophyllus, Pteridium aquilinum, Aralia nudicaulis,* and *Cornus canadensis*. A moss layer of *Pleurozium schreberi* may be absent or present up to 40% cover.

Globally
This community is a closed canopy forest dominated by a combination of *Picea glauca* and/or *Abies balsamea*. Some stands have a preponderance of one of these species, with the other an important associate. Typically *Picea glauca* is the more abundant (Maycock and Curtis 1960, MN NHP 1993). Common associates include *Acer rubrum, Betula papyrifera, Picea mariana, Pinus banksiana, Populus tremuloides*, and *Populus balsamifera*. There is usually a prominent shrub/sapling layer containing *Abies balsamea, Acer spicatum, Corylus cornuta, Diervilla lonicera, Lonicera canadensis, Picea glauca, Rosa acicularis*, *Rubus pubescens*, and *Sorbus americana*. The herbaceous layer is often moderately sparse, with species such as *Anemone quinquefolia, Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris carthusiana, Maianthemum canadense, Mitella nuda, Trientalis borealis, Vaccinium myrtilloides*, and (eastward) *Viburnum cassinoides*. Mosses include *Dicranum polystem, Pleurozium schreberi, Ptilium crista-castrensis,* and *Rhytidiadelphus triquetrus* (Sims *et al.* 1989, Chambers *et al.* 1997).

CONSERVATION RANK G4G5.

DATABASE CODE CEGL002446

COMMENTS
Voyageurs National Park
Diagnostic features of the type include the canopy of *Picea glauca* and *Picea mariana* or *Abies balsamea*, with less than 25% cover of deciduous trees. When deciduous trees, especially *Betula papyrifera* and *Populus* spp., are present in the canopy with about 25% cover, this type grades into the Spruce-Fir-Aspen Forest. In stands where beaver and spruce budworm have taken most of the trees, this type can grade into the Boreal Hazelnut-Serviceberry Rocky Shrubland. This shrubland, however, must have less than 25% cover of trees. If open bedrock is present in the stand, there must be less than 60% cover of spruce-fir and canopy closure must be prevented by the exposed bedrock for the stand to be considered a Boreal Pine Rocky Woodland type.

Stands of this type are often located above beaver ponds and adjacent to lakes and, therefore, subject to beaver feeding. In many circumstances, the open canopy of these stands is the result of beavers removing the deciduous trees (in what may have been, for example, a Spruce-Fir-Aspen Forest). *Abies balsamea* is also subject to defoliation by the Spruce Budworm.

Globally
In Northern Minnesota, stands of this type are often located above beaver ponds and adjacent to lakes and, therefore, subject to beaver feeding. In many circumstances, the open canopy of these stands is the result of beavers removing the deciduous trees (in what may have been, for example, a Spruce-Fir-Aspen Forest). *Abies balsamea* is also subject to defoliation by the Spruce Budworm (M. Smith personal communication 1999).

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

La Roi, G. H. 1967. Ecological studies in the boreal spruce-fir forests of the North American taiga. I. Analysis of the vascular flora. Ecological Monographs. 37(3):229-253.

Maycock, P. F. 1961. The spruce-fir forest of the Keweenaw Peninsula, Northern Michigan. Ecology. 42(2):357-365.

Maycock, P. F. and J. T. Curtis. 1960. Ecological Monographs. 30(1):1-35.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

6.11 Boreal Hardwood Forests

Populus tremuloides - Betula papyrifera / (Abies balsamea, Picea glauca) Forest (Aspen - Birch / Boreal Conifer Forest)

COMMON NAME	Trembling Aspen - Paper Birch / (Balsam Fir, White Spruce) Forest
SYNONYM	*Aspen - Birch / Boreal Conifer Forest*
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	POPULUS TREMULOIDES - BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This is one of the most abundant and widespread types in the Park and environs.

Globally

This community is found in Manitoba, Ontario, northern Minnesota, northern Wisconsin, and Michigan.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type occurs in a wide variety of positions on the landscape from well drained ridges with shallow soils to moderately drained lower areas. Though they can occupy moderate (6-14 degree) slopes, they generally occur on flat to gently sloping terrain with variable aspects. Soils are very rocky loams or fine sandy loams ranging from 2-10 cm deep. The more mesic example of this type may occur over a clay subsoil. An abundance of coarse woody debris is common.

Globally

This community is found on a variety of topographic positions. Omann and Ream (1971) found it on ridgetops, upper, mid, and lower slopes. These slopes are gentle to moderate. The soils are deep, well drained to rapidly drained mineral soils (Sims *et al.* 1989). The soils are usually loam but can be clay, silt, or sand.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera, Populus grandidentata*
Tree sub-canopy	*Abies balsamea, Acer rubrum*
Tall shrub	*Abies balsamea, Acer rubrum, Corylus cornuta*
Short shrub	*Corylus cornuta, Populus tremuloides*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera*
Short shrub	*Abies balsamea, Picea glauca*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Populus tremuloides, Betula papyrifera, Abies balsamea, Populus grandidentata

Globally

Populus tremuloides, Betula papyrifera, Abies balsamea

VEGETATION DESCRIPTION

Voyageurs National Park

This is one of the most variable types in the Park and environs. It includes fairly young forests, mostly outside the park, where the canopy is 5-10m tall, to the more mature stands, mostly within the park, where the canopy is 20-35m tall. Typically, the canopy is dominated by *Populus tremuloides, Betula papyrifera*, and/or *Populus grandidentata*, is 10-20m tall, and has a cover of 70-80%. The sub-canopy is usually absent, but if present, contains low cover (20-30%) and *Abies balsamea* or *Acer rubrum*. The tall shrub stratum, on the other hand, is nearly always present at around 30-40% cover. *Abies balsamea* is the most common species in the sub-canopy and tall shrub layers, though in rare situations *Acer rubrum* may be more abundant. The short shrub stratum very often contains *Corylus cornuta*, commonly around 30% cover, but reaching 90-100% cover in some circumstances. The cover of the herbaceous stratum is usually 70-90% and can in some circumstances be composed almost entirely of *Pteridium aquilinum, Aster macrophyllus,* and *Aralia nudicaulis*. In addition to these, the herbs *Cornus canadensis, Rubus pubescens, Clintonia borealis*, and *Maianthemum canadense* may also be present.

Globally

This community is dominated by deciduous trees, with a moderate amount of conifers (<25%). The dominant tree species do not have dense leaf layers and allow a significant amount of light to pass through. This promotes the establishment of prominent sapling and shrub layers and a moderately dense herbaceous stratum. The canopy is dominated by *Betula papyrifera* and *Populus tremuloides,* and occasionally *Populus grandidentata*. Conifer associates include *Abies balsamea* and *Picea glauca*, either in the canopy or, more characteristically, in the subcanopy. *Abies balsamea* and *Picea glauca* are abundant in the sapling layer. Common shrubs include *Acer spicatum, Corylus cornuta, Diervilla lonicera, Linnaea borealis, Lonicera canadensis, Rosa acicularis, Rubus pubescens, Sorbus decora,* and *Vaccinium myrtilloides*. The herbaceous stratum is sometimes dominated by *Aster macrophyllus*, but can include a diversity of forbs, such as *Anemone quinquifolia*, *Aralia nudicaulis, Clintonia borealis, Cornus canadensis, Galium triflorum, Maianthemum canadense, Mitella nuda, Pteridium aquilinum, Streptopus roseus*, *Trientalis borealis,* and *Viola renifolia*. Mosses include *Plagiomnium cuspidatum, Pleurozium schreberi, Ptilium crista-castrensis,* and *Rhytidiadelphus triquestris* (Sims *et al.* 1989, Chambers *et al.* 1997). Diagnostic features of this type are the dominance by both *Populus tremuloides* and *Betula papyrifera*, boreal conifer associates (but very little *Picea mariana* or *Pinus banksiana*), and lack of more southern hardwoods (such as *Acer saccharum*).

CONSERVATION RANK G5.

DATABASE CODE CEGL002466

COMMENTS

Voyageurs National Park

Diagnostic features of the type include the canopy of *Populus tremuloides, Betula papyrifera,* and/or *Populus grandidentata* with less than 25% cover by conifers. *Abies balsamea* present in the sub-canopy or shrub strata. Both dry and mesic versions of this type are common in the park. This type can resemble the Spruce-Fir-Aspen Forest but has < 25% spruce or fir in the canopy. The richer versions of this type, which generally occur on deeper soils, can grade into the Trembling Aspen-Balsam Poplar Lowland Forest. This occurs commonly in areas where there is less topographic relief and lacustrine clay is more common in the subsoil. Bedrock outcrops can also occur within stands of the Aspen-Birch-Boreal Conifer Forest. When the canopy is < 60% cover and canopy closure is prevented by the presence of bedrock outcrops, this type becomes the Mixed Aspen Rocky Woodland.

The Aspen-Birch-Red Maple Forest contains *Acer rubrum* in place of *Abies balsamea* in the sub canopy and shrub layers. The Aspen-Birch-Red Maple Forest, however, is very rare in the park. Where *Acer rubrum* and *Abies balsamea* occur mixed in the sub canopy and shrub layers, the stand is considered an Aspen-Birch-Boreal Conifer Forest.

Where the Aspen-Birch-Boreal Conifer Forest occurs adjacent to beaver ponds, beaver may cut many trees resulting in a very open canopy and, eventually, a Boreal Hazelnut-Serviceberry Rocky Shrubland community.

Globally

Historically, this type originated after catastrophic fires in boreal systems. Aspen can form suckers from the roots of

fire-killed trees, up to 30 m from the main stem, and has tiny, light seeds that can travel thousands of meters (Heinselman 1996). This type can cover extensive areas because of logging and repeated post-logging fires, which eliminated most of the local pine seed sources (MN NHP 1993). Locally, where this type occurs adjacent to beaver ponds, beaver may cut many trees resulting in a very open canopy and, eventually, a Boreal Hazelnut-Serviceberry Rocky Shrubland (CEGL005197) community (M. Smith personal communication 1999).

REFERENCES

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Hansen, H. L., L. W. Krefting, and V. Kurmis. 1974. The forest of Isle Royale in relation to fire history and wildlife. University of Minnesota, Agricultural Exper. Station, Tech. Bull. 294, Forestry Series 13.

Heinselman, M.L. 1996. The Boundary Waters wilderness ecosystem. University of Minnesota Press, Minneapolis, MN. 334 p.

Ohmann, L. F., and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Populus tremuloides - Betula papyrifera - (Acer rubrum, Populus grandidentata) Forest (Aspen - Birch - Red Maple Forest)

COMMON NAME	Trembling Aspen - Paper Birch - (Red Maple, Bigtooth Aspen) Forest
SYNONYM	Aspen - Birch - Red Maple Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	POPULUS TREMULOIDES - BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is very localized in the park and is not treated separately from other aspen-birch types.

Globally

This community is found in Ontario, northern Minnesota, northern Wisconsin, and Michigan.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

Globally

This community is mostly found on level to rolling topography. It can occur on upper slopes or plateaus or in valley bottoms (Ohmann and Ream 1971). The soil is typically deep, sandy loam or loamy sand (Alban *et al.* 1991). The sites are on glacial outwash, lacustrine deposits, or moraines (Ohmann and Ream 1971, Sims *et al.* 1989). Most are well drained; however, this community can be found on somewhat poorly drained sites.

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera, Acer rubrum*
Tall shrub	*Corylus cornuta*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Globally

Populus tremuloides, Betula papyrifera, Acer rubrum, Corylus cornuta

VEGETATION DESCRIPTION

Voyageurs National Park

This type was not described separately at Voyageurs National Park.

Globally

This deciduous forest community has a moderately closed canopy usually dominated by *Populus tremuloides* and *Betula papyrifera*. *Acer rubrum* and *Populus grandidentata* may be absent to dominant. Other minor components of the overstory may include *Abies balsamea*, *Pinus resinosa*, *Pinus strobus*, *Picea glauca*, and *Quercus rubra*. The shrub layer is approximately 2 meters tall and often well developed (MN NHP 1993). The most abundant species are *Acer spicataum*, *Amelanchier* spp., *Corylus cornuta*, *Diervilla lonicera*, and *Rosa acicularis*. Other shrubs

present include *Lonicera canadensis*, *Rubus pubescens, Vaccinium angustifolium*, and *Vaccinium myrtilloides*. The herbaceous layer tends to contain many species. Common species include *Aralia nudicaulis*, *Aster macrophyllus*, *Clintonia borealis*, *Maianthemum canadense*, *Trientalis borealis*, and *Viola* spp.

CONSERVATION RANK G5.

DATABASE CODE CEGL002467

COMMENTS

Voyageurs National Park

The Aspen-Birch-Red Maple Forest contains *Acer rubrum* in place of *Abies balsamea* in the subcanopy and shrub layers. The Aspen-Birch-Red Maple Forest, however, is very rare in the park, and where *Acer rubrum* and *Acer balsamea* occur mixed in the subcanopy and shrub layers, the stand is considered an Aspen-Birch/Boreal Conifer Forest.

REFERENCES

Alban, D. H., D. A. Perala, M. F. Jurgensen, M. E. Ostry, and J. R. Probst. 1991. Aspen ecosystem properties in the Upper Great Lakes. Res. Pap. NC-300. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 47 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F., and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Betula papyrifera / Diervilla lonicera - (Abies balsamea) Forest (Paper Birch / Fir Forest)

COMMON NAME	Paper Birch / Bush-honeysuckle - (Balsam Fir) Forest
SYNONYM	Paper Birch / Fir Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

Large stands of this type are known from only one location in Voyageurs National Park - Deer Island. Smaller, isolated patches of this forest, however, can be found scattered throughout the park.

Globally

This community is found in northern Michigan, northern Minnesota, southern Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type usually occurs on flat terrain or gentle slopes with variable aspects. Soils of this community are shallow sandy loams usually 3-10 cm deep over bedrock.

Globally

This community is found on fresh to moist soils (Hansen *et al.* 1971, Sims *et al.* 1989). In Ontario, stands occur on coarse textured, non-calcareous mineral soils, at times very shallow (<15 cm). The soil texture is typically coarse loam or sandy loam (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Betula papyrifera*
Tall shrub	*Corylus cornuta*
Short shrub	*Vaccinium angustifolium*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*

Globally

Stratum	Species
Tree canopy	*Betula papyrifera*
Short shrub	*Diervilla lonicera*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Betula papyrifera, Corylus cornuta, Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum

Globally

Betula papyrifera, Diervilla lonicera, Aster macrophyllus, Aralia nudicaulis

VEGETATION DESCRIPTION

Voyageurs National Park

The canopy is dominated by deciduous trees. *Betula papyrifera* is frequently the only tree species in the canopy. Lesser amounts of *Populus tremuloides* or *Abies balsamea* may be present or absent. The canopy is moderately open (60-80% cover) and usually composed of trees 10-15 meters tall. *Corylus cornuta* is the dominant shrub and almost always present either in dense colonies (60-80% cover) or in scattered patches (5-25% cover). Other shrubs that may be present at low cover include *Amelanchier* spp., *Acer rubrum, Abies balsamea, Vaccinium angustifolium,* and *Populus tremuloides*. The herbaceous layer is typically 70-90% cover and consists mainly of *Aster macrophyllus, Pteridium aquilinum*, and *Aralia nudicaulis*. The following herbs may also be found at low cover: *Lycopodium dendroideum, Maianthemum canadense, Trientalis borealis,* and *Clintonia borealis*.

Globally
The canopy of this forested community is closed to moderately open. *Betula papyrifera* is the dominant canopy tree and can form nearly pure stands. *Populus tremuloides*, *Abies balsamea*, *Picea glauca*, and, especially in Canada, *Pinus banksiana* can be found in minor amounts, as well. Tree density can be high, but the growth form and size of the canopy dominants allows significant light to pass through. *Abies balsamea* is common to dense in the understory (Hansen *et al.* 1971) and shrubs such as *Corylus cornuta*, *Diervilla lonicera*, *Rosa acicularis*, and *Taxus canadensis*. The herbaceous layer is similar to other dry-mesic to mesic northern communities. Species found in this layer include *Aralia nudicaulis*, *Aster macrophyllus*, *Clintonia borealis*, *Cornus canadensis*, *Maianthemum canadense*, and *Trientalis borealis*.

CONSERVATION RANK G4?.

DATABASE CODE CEGL002463

COMMENTS
Voyageurs National Park
Diagnostic feature of the type is a canopy comprised almost entirely of *Betula papyerifera*. The Paper Birch/Fir Forest is very similar to the Aspen-Birch/Boreal Conifer Forest but its canopy is composed primarily of *Betula papyrifera*. If the canopy cover of *Betula papyrifera* is less than 90%, the stand is considered an Aspen-Birch/Boreal Conifer Forest. Shrub and herbaceous layers of the two communities are very similar.

Globally
This type often originates after fires. In the absence of disturbance the community may succeed to *Picea glauca* - *Abies balsamea* evergreen or mixed evergreen-deciduous community types (MN NHP 1993). Further north in Canada, it may succeed to *Pinus banksiana* and *Picea mariana* upland forests (Sims et al. 1989). Paper birch has tiny, light-winged seeds, easily blown long distances by wind. Its bark is very flammable, and even ground fires may kill a mature stem. Birch can resprout from the root collar at the base of the trunk, but not from roots further away from the tree (Heinselman 1996).

REFERENCES
Hansen, H. L., L. W. Krefting, and V. Kurmis. 1974. The forest of Isle Royale in relation to fire history and wildlife. University of Minnesota, Agricultural Exper. Station, Tech. Bull. 294, Forestry Series 13.

Heinselman, M.L. 1996. The Boundary Waters wilderness ecosystem. University of Minnesota Press, Minneapolis, MN. 334 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Populus tremuloides - Populus balsamifera - Mixed Hardwoods Lowland Forest (Trembling Aspen - Balsam Poplar Lowland Forest)

COMMON NAME	Trembling Aspen - Balsam Poplar - Mixed Hardwoods Lowland Forest
SYNONYM	Trembling Aspen - Balsam Poplar Lowland Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Temporarily flooded cold-deciduous forest (I.B.2.N.d)
ALLIANCE	POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is most common in the west and southwest part of the park and in park environs, where the terrain is relatively flat and poorly drained soils are more common, but also occurs locally elsewhere in the park in areas surrounded by upland or in drainage areas adjacent to lakes.

Globally

This association is found in northern Michigan, northern Wisconsin, and Ontario.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This type generally occurs on very flat to slightly sloping (<5%) terrain. It can be extensive where the terrain is relatively flat and where poorly drained soils are more common, but it can also be found in low areas surrounded by upland or in drainage areas adjacent to lakes. The soils are generally poorly drained and relatively deep, reaching depths greater than 35 cm. The "A" horizons are usually 4-10 cm loams or silt loams with a high amount of organic matter. The "B" horizons, if present, are 1-5 cm clay loams and the "C" horizons are consistently deep, heavy, lacustrine clays or sandy clays.

Globally

Stands are found on lower slopes and draws, occasionally under seepage conditions. Soils are deep, fresh to moist, poorly drained, and often fine-textured and of lacustrine origin (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Populus tremuloides, Populus balsamifera*
Tree sub-canopy	*Fraxinus nigra*
Tall shrub	*Fraxinus nigra, Abies balsamea, Alnus incana*
Short shrub	*Rubus pubescens*
Fern	*Dryopteris carthusiana, Equisetum sylvaticum*
Graminoid	*Carex* spp.

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Populus balsamifera, Betula papyrifera*

CHARACTERISTIC SPECIES

Voyageurs National Park

Populus tremuloides, Populus balsamifera

Globally
Populus balsamifera, Populus tremuloides, Alnus incana, Calamagrostis canadensis

VEGETATION DESCRIPTION
Voyageurs National Park
The canopy of the Trembling Aspen-Balsam Poplar Lowland Forest is commonly 15-20m tall and consists of *Populus tremuloides* and *Populus balsamifera. Fraxinus nigra* can occasionally reach the canopy as well, though is usually found only in the sub canopy at 20-30% cover. The shrub layer is highly variable, ranging from 20-90% cover. It commonly consists of *Fraxinus nigra, Abies balsamea* and *Alnus incana.* The herbaceous layer is typically very diverse and covers 80-90% of the forest floor. The most abundant herbaceous species are *Rubus pubescens, Dryopteris carthusiana,* and *Equisetum sylvaticum. Carex intumescens, Carex gracillima, Bromus ciliatus, Iris versicolor, Calamagrostis canadensis,* and *Asarum canadense* are also common.

Globally
Stands are dominated by deciduous trees, but can contain a mix of evergreen species. Dominants include *Populus tremuloides* and *Populus balsamifera*. Other associates include *Abies balsamea, Betula papyrifera*, and *Picea glauca*. The shrub and herb layer are often fairly rich. Typical shrubs/saplings include *Abies balsamea, Alnus incana, Amelanchier* spp., *Cornus sericea, Ribes* spp., *Rosa acicularis, Rubus idaeus*, and *Rubus pubescens*. The herb layer contains *Aralia nudicaulis, Aster ciliolatus, Aster macrophyllus, Anemone quinquifolia, Calamagrostis canadensis, Carex* spp. (including *Carex intumescens, Carex gracillima*), *Clintonia borealis, Cornus canadensis, Dryopteris carthusiana, Equisetum* spp. (including *Equisetum sylvaticum*), *Galium triflorum, Maianthemum canadense, Mertensia paniculatus, Mitella nuda, Petasites frigidus* var. *palmatus, Streptopus roseus*, and *Viola renifolia*. *Calamagrostis canadensis* can be abundant in the herb layer (Sims *et al.* 1989, McCarthy *et al.* 1994).

CONSERVATION RANK G5.

DATABASE CODE CEGL005036

COMMENTS
Voyageurs National Park
Diagnostic features of the type include a canopy of *Populus tremuloides* and/or *Populus balsamifera* with *Fraxinus nigra, Alnus incana*, or *Populus balsamifera* present in the sub canopy or shrub layers. Though the canopy can be very similar to the Aspen Birch/Boreal Conifer Forest (CEGL002466), that type does not contain *Fraxinus nigra, Populus balsamifera* or *Alnus incana* in the canopy, subcanopy or shrub layers. That type also has lower diversity of herbaceous plants than this type. That type also has well-drained soils compared to the poorly drained, and relatively deep soils of this type. Very often, stands are found adjacent to (and slightly drier than) the Black Ash-Mixed Hardwood Swamp (CEGL002105) or as inclusions within the Aspen Birch/Boreal Conifer Forest (CEGL002466).

REFERENCES
McCarthy, T.G., R.W. Arnup, J. Nieppola, B.G. Merchant, K.C. Taylor, and W.J. Parton. 1994. Field Guide to Forest Ecosystems of Northeastern Ontario. NEST Field Guide FG-001, Ontario Ministry of Natural Resources, Northeast Science and Technology, Timmins ON.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

6.12 Northern Hardwood Forests

Quercus macrocarpa / (Amelanchier alnifolia, Cornus drummondii) / Aralia nudicaulis Forest (Northern Bur Oak Mesic Forest)

COMMON NAME	Bur Oak / (Saskatoon Serviceberry, Roughleaf Dogwood) / Wild Sarsaparilla Forest
SYNONYM	Northern Bur Oak Mesic Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Lowland or submontane cold-deciduous forest (I.B.2.N.a)
ALLIANCE	QUERCUS MACROCARPA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Voyageurs National Park

This type is most common on islands or peninsulas on Lake Kabetogama.

Globally

This community occurs in the northern tallgrass region of western Minnesota (with isolated stands in the western Border Lakes region in Voyageurs National Park), eastern Dakotas, western Iowa, and northeastern Nebraska.

ENVIRONMENTAL DESCRIPTION

Voyageurs National Park

This community type occurs on level to gently sloping terrain with variable aspects. It is most common on dry-mesic to mesic sites on islands or peninsulas. Soils are loams or sandy loams and can be shallow (3-7 cm) or relatively deep (20-35+ cm). In stands with shallower soils, patches of exposed bedrock may exist.

Globally

Stands This community typically occur on gentle to steep slopes of draws and bluffs, historically where fire breaks occurred. Soils in the northern part of the range include well-drained sandy loams to loams formed in glacial till, and in the southern part include silty to sand loams formed primarily in loess and glacial till (Minnesota NHP 1993, Rosburg and Glenn-Lewin 1996, Steinauer and Rolfsmeier 1997).

MOST ABUNDANT SPECIES

Voyageurs National Park

Stratum	Species
Tree canopy	*Quercus macrocarpa, Fraxinus pennsylvanica, Tilia americana*
Tall shrub	*Amelanchier* spp., *Corylus cornuta, Fraxinus pennsylvanica, Tilia americana*
Forb	*Aster macrophyllus, Aralia nudicaulis, Osmorhiza longistylis*

Globally

Stratum	Species
Tree canopy	*Quercus macrocarpa, Fraxinus pennsylvanica, Tilia americana, Celtis occidentalis*
Tall shrub	*Amelanchier* spp., *Corylus cornuta, Cornus drummondii*
Forb	*Aralia nudicaulis*

CHARACTERISTIC SPECIES

Voyageurs National Park

Quercus macrocarpa, Fraxinus pennsylvanica, Tilia americana

Globally

Quercus macrocarpa, Fraxinus pennsylvanica, Celtis occidentalis, Corylus cornuta, Cornus drummondii, Aralia nudicaulis

VEGETATION DESCRIPTION

Voyageurs National Park

The canopy in this community is typically dominated by *Quercus macrocarpa* with *Fraxinus pennsylvanica* or *Tilia americana* present at low cover or absent. In some circumstances, *Fraxinus pennsylvanica* or *Tilia americana* may dominate the canopy to the near exclusion of *Quercus macrocarpa*. *Populus tremuloides* and *Acer saccharinum* may also be present in the canopy at low cover. A shrub layer of 20-80% cover is almost always present and may consist of the following species: *Fraxinus pennsylvanica, Tilia americana, Amelanchier* spp., *Corylus cornuta, Ostrya virginiana*, and/or *Viburnum rafinesquianum*. The herbaceous strata is usually well developed and comprises 80-90% cover. *Aster macrophyllus, Aralia nudicaulis, Osmorhiza longistylis*, and *Pteridium aquilinum* usually comprise the majority of the cover in this community. The herbs *Circaea lutetiana, Carex arctata, Carex gracillima,* and *Impatiens capensis* are also common.

Globally

The tree layer is a closed canopy dominated by *Quercus macrocarpa* with a mixture of shade-tolerant trees, such as *Celtis occidentalis*, *Fraxinus pennsylvanica*, *Ulmus americana*, and *Ulmus rubra*, and further north *Populus tremuloides*. Occasionally *Ostrya virginiana*, *Tilia americana,* or *Quercus rubra* are present. The shrub layer is often prominent, dominated by *Amelanchier alnifolia* and *Corylus cornuta* in the north and *Cornus drummondii* in the south. Other species shared across the range include *Prunus virginiana*, *Ribes missouriense*, *Rubus occidentalis*, *Symphoricarpos occidentalis*, *Symphoricarpos orbiculatus*, and *Zanthoxylum americanum*. Vines include *Celastrus scandens*, *Parthenocissus quinquifolia*, and *Toxicodendron radicans*. The herbaceous layer can be quite sparse. Common species include *Aralia nudicaulis*, *Carex assiniboinensis*, *Carex blanda*, *Elymus villosus*, *Galium boreale*, *Geum canadense*, *Maianthemum stellatum*, *Osmorhiza longistylis*, *Poa pratensis*, *Polygonatum biflorum*, and *Viola sororia*. At Voyageurs NP, the understory is dominated by *Aster macrophyllus, Aralia nudicaulis, Osmorhiza longistylis*, and *Pteridium aquilinum* (Minnesota NHP 1993, Rosburg and Glenn-Lewin 1996, Steinauer and Rolfsmeier 1997).

CONSERVATION RANK G4.

DATABASE CODE CEGL002072

COMMENTS

Voyageurs National Park

Diagnostic features of the type include the canopy of *Quercus macrocarpa, Fraxinus pennsylvanica*, or *Tilia americana*. In sites with shallow soils and exposed bedrock, some sites may approach woodland physiognomy and grade into the Northern Pin Oak-Bur Oak Rocky Woodland. If the total canopy cover is <60% and canopy closure is prevented by the presence of exposed bedrock, the site is considered a Northern Pin Oak-Bur Oak Rocky Woodland.

The more mesic versions of this type have fairly diverse herbaceous stratas and can contain species that are found in few other communities in the park. Some of these species are *Uvularia grandiflora, Uvularia sessiliflora, Trillium* spp., and *Smilax herbacea*.

Evidence of logging and past human habitation are frequently present in these stands, especially those on islands in Lake Kabetogama.

Globally

There may be a shift in composition between the Iowa -Nebraska stands and the stands to the north. The more characteristic set of northern U.S. species include *Amelanchier alnifolia, Carex assiniboinensis*, and *Aralia nudicaulis*, and the more central U.S. species include *Cornus drummondii*. *Poa pratensis*, generally considered an exotic, can dominate the ground layer across the range of the type.

REFERENCES

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Rosburg, T. R. and D. C. Glenn-Lewin. 1996. Species composition and environmental characteristics of grassland and ecotonal plant communities in the Loess Hills of western Iowa (USA). Natural Areas Journal 16:318-334.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 p.